

Having heard all of the excuses and arguments, here are—

The Top Ten Reasons . . . Archers Must Exercise

Archery Fitness

Number 10

Exercise decreases obesity and obesity related illnesses such as diabetes and hypertension.

Cardiovascular conditioning has repeatedly been proven to reduce the risk of obesity-related illnesses. It is estimated that a major portion of the American population is overweight or obese. The top two causes for this phenomenon are overeating, including too many soft/fruit drinks and large portion sizes, and lack of physical activity. With careful portion control and a moderate physical activity program, obesity and obesity related illnesses will be reduced.

Number 9

Exercise reduces the risk of cardiovascular illness.

Obesity and hypertension are both risk factors for cardiovascular illness. As people increase in weight, the incidence of cardiovascular illness increases. Cardiovascular disease and obesity-related illnesses are some of the more easily preventable illnesses. A comprehensive conditioning program which includes aerobic, strength, and flexibility training can prevent the onset of these illnesses.

Number 8

Strength training increases your base metabolic rate.

Most individuals know a cardiovascular conditioning program will improve their health, but did you know strength training can give your archery workouts a boost? Muscle fiber requires more energy, even at rest, causing an increase in the total number of calories burned by your body everyday. An added benefit is increased capacity for weight (fat) loss. Make sure you include a total body strength workout into your routine three times a week.

Number 7

Conditioning allows archers to shoot with greater intensity during training sessions.

A fit archer will be able to work with more intensity during archery training sessions. Overall fit-

“Physical conditioning is rated the number one stress reliever.”

ness allows archers to increase the intensity of their shooting. Even new archers notice their improved ability to shoot once they have started a

conditioning program. While the point is often debated, strength training can help an archer increase his or her bow weight, especially strength training for the back, shoulders, and rotator cuff area.

Number 6

Conditioning allows archers to shoot more frequently.

Not only will archers be able to shoot with more

“Strength and flexibility training are the cornerstones of injury prevention.”

intensity during training, fit archers are able to shoot and train more frequently. Contrary to what some coaches tell their archers, strength training will not interfere with your ability to shoot. A well designed, properly executed strength program will improve the muscle structure involved in the shot. To maximize both your strength training program and your archery training program should follow these guidelines: perform your strength routine after you shoot, never lift more weight than you can (or should) handle, always use proper form when lifting, warm-up before lifting and shooting and cool down after each session, give your muscles a rest between strength training and shooting, and decrease your lifting program at least one week before a tournament. These guidelines should be tailored to each individual archer. For example, a beginning archer/strength conditioner should only lift minimal weights and allow at least 24 hours between strength training and shooting. A highly conditioned archer with years of strength training experience will even train before shooting and during the competitive season without any decrease in shooting ability or adverse effects.

Number 5

Exercise, particularly weight and flexibility training reduces the risk of injury.

Strength and flexibility training are the cornerstones of injury prevention. Weight bearing strength training, e.g. working with free weights, increases bone density. Increased bone density indicates stronger bones. Strength training also increases muscle mass, reducing the risk of overuse injuries. Flexibility training pulls it all together. Flexibility training increases the range of motion of joints and suppleness of the muscles. This decreases the risk of joint and muscle injuries.

Number 4

Conditioning provides archers with a stronger base.

Any archer who has shot a tournament in the wind knows the importance of a strong base. While many archers can be convinced of the importance of developing the “archery muscles,” well developed core and base muscles are of equal and perhaps greater importance. The core muscles of the chest, abdomen, upper and lower back, and gluteus provide a strong core for the archery draw. The base muscles of the legs provide a strong support structure for archery. Every muscle used in the archery draw places stress upon the core and base mus-

cular structure. The core muscles are particularly important for stability in the archery draw.

Number 3

Cardiovascular conditioning can improve performance in high stress situations.

If you do not believe this one, try the following experiment. Set up for an archery training session (indoors or out), put on all of your equipment so you are totally ready to shoot. Place your bow in its stand. Have a stopwatch or timer. Now run to the 30 meter line and back (if you are indoors or using a shorter distance, run to the target and back twice). Immediately pick up your bow and shoot 3 shots. Allow no more than 45 seconds for the three shots. Put your bow down and repeat the sequence two more times. How did you feel? How was your shooting affected by your elevated heart rate? This experiment simulates the elevated heart rate of competition and high stress situations. Next, start and adhere to a cardiovascular conditioning program. After one month, two months, six months, repeat the experiment. You will notice the difference. A cardiovascular conditioning program will lower your resting heart rate. Such a program will also keep your heart rate lower in stressful situations reducing the effect of nervousness and excitement on your archery shot.

Number 2

Archers are athletes.

This one is included as a personal conviction. Archers, particularly target archers who compete or aspire to compete on the national and world level, are athletes. As athletes, archers have an obligation to themselves, their sport, their sponsors, their national governing body, their Olympic Committee, their country, their families, and their supporters (not to mention their teammates), their fellow archers (including those who did not make the team), and their coaches to act like athletes. This includes a comprehensive training program including strength, flexibility, and cardiovascular training in addition to their archery training program.

Number 1

Physical conditioning improves mental and over-all performance.

Physical conditioning is rated the number one stress reliever. Research also indicates exercise is effective at reducing minor depression. Exercise releases chemicals

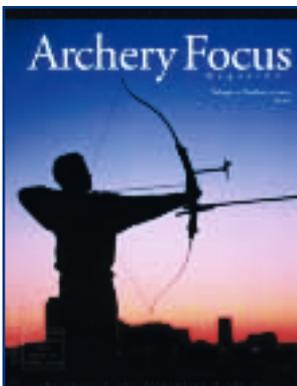
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into the bloodstream which enhance your mood and your sense of well being. Regular exercise increases mental acuity and results in a positive mental outlook. The extra boost from exercise may just be the one element you need to improve your archery shot, your score, and your competitive standing. Add an improved mental outlook from exercise along with a lower heart rate, a healthy body, and an impressive physique to your archery arsenal and see the results!

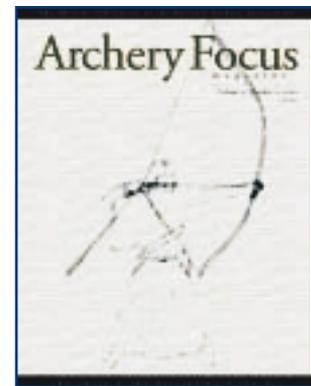
Just do it!



Annette Musta is a certified personal trainer who owns and operates her own business, ARH Sports and Fitness in Pennsylvania. She has been shooting for 24 years, but not seriously (she says) until the last five years. She has been a professional ballet dancer (which is why she is known around the ARCO Training Center as "the dancer") and is currently a licensed pilot. She is the founder and Executive Director of the Pass the Torch Foundation, which matches school age children with athletes training for international competition.



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The Developer of Archery Focus magazine The Online Edition

by Annette M. Musta

The Importance of Being Flexible

Flexibility is the third major component in a balanced fitness program. Good flexibility protects joints from injury, increases the efficiency and performance of the joints and muscles, enhances athletic performance, and improves muscle balance. In addition, flexibility exercises reduce stress levels and enhance the overall enjoyment of physical activity. Yet many individuals and athletes completely ignore the flexibility component of their fitness program.

A flexible joint has a complete *Range of Motion* (ROM). ROM is defined as the ability of a joint to move freely in every direction. Joint mobility is limited by the joint structure, the elasticity and strength of the surrounding muscles, and the connective tissue of the joint. Flexibility training minimizes these limitations. Like other aspects of physical conditioning, ROM can be improved with a complete flexibility training program.

There are two basic types of flexibility – static flexibility and dynamic flexibility. *Static flexibility* is the ROM around a joint. An example of static flexibility is an individual performing a split (see photo). There is little or no emphasis on speed of movement in static flexibility. *Dynamic or active flexibility* encompasses speed of movement and the strength, power, tissue resistance, and neuromuscular coordination of the joint and surrounding muscle. A dancer performing a leap requires not only the static flexibility of the split but also the strength and coordination to perform the dynamic movement. A complete flexibility program employs different exercises to enhance both static and dynamic flexibility.



Head-to-Toe Stretches

The following stretches involve slow and controlled movement through the full range of motion of each joint. Slow stretching results in long-term elongation of the muscle tissue and minimizes the risk of injury.

Warm-up First Before performing any stretching activity, it is imperative to warm-up your muscles first. Your warm-

up should consist of any slow rhythmic exercise employing the major muscle groups. Marching in place while pumping the arms, fast walking, light jogging, and rhythmic dancing are all examples of warm-up movement. A minimum of ten minutes of warm-up exercises must be performed prior to starting the full body stretching program below. Warming up increases the blood flow to the muscles making them pliable and more receptive to stretching. An inadequate warm-up increases the risk of injury and painful muscles.

Use Proper Technique All of these stretches can be performed after a proper warm-up. All movement should be slow and controlled. Exhale as you perform each stretch and hold the stretch for 15-20 seconds. Only stretch as far as you can *comfortably*. Never force a stretch. Do not bounce. A properly performed stretch should not cause pain. If you feel pain, stop immediately. Warm joints and muscles will stretch more readily.

Whole body stretching should be performed daily. Always stretch each body part you have used during an exercise session. Use the “rest” time between weightlifting sets to stretch the body part used. Remember to stretch between ends when shooting. Studies have shown stretching in conjunction with muscle toning exercise will increase the benefits of the exercise. In other words, if you stretch while you lift weights you will achieve better results.

The Stretches

Hip Flexor Start this stretch by kneeling on one knee with the other knee bent, the foot flat out in front. Gently lean forward into the extended knee, stretching the hip flexors. Hold the stretch before changing sides. You should feel this stretch in your hip muscles and lower back. (see photo)



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Seated Hip and Leg Stretch

Sit on the floor with both legs stretched out in front. Bend the right leg at the knee placing the bottom of the foot against the left leg (see photo). Extend your arms and bend forward at the waist reaching toward your extended leg. Hold the stretch before switching sides. You should feel this stretch in your leg and hip and lower back.

Standing Leg Stretch Stand with your feet hip width apart. Keep your knees “soft” (slightly bent). Reach up over your head with your hands. As you breathe out, slowly and gently bend forward at the waist, reaching for your toes (see photo). Hold the stretch for a count of ten before slowly rolling your spine, vertebrae by vertebrae, back up to standing position. You should feel this stretch in the back of your legs and lower back. *If you have a back injury, avoid this stretch.*



Lying Hamstring Stretch Lay down on your back with your knees bent, feet flat on the floor. Straighten the right leg and lift it perpendicular to your body. Grasp your right leg and pull it gently toward your body (see photo). Hold for a count of ten and release. Switch sides. Repeat three times per side.



Quadriceps Stretch. Stand on your left leg, bend your right leg behind you at the knee and grasp your foot with your right hand (hold on to a chair for stabilization). Hold this position for a count of ten. You should feel the stretch in the front of your bent leg. Repeat on the left side.

Calf Stretch Stand with your feet together. Step your right foot out in front of you, bend your knee slightly and push the heel of your back foot into the ground. Feel the stretch in the calf muscles of your back leg. Hold for a count of ten. Repeat on the other side.

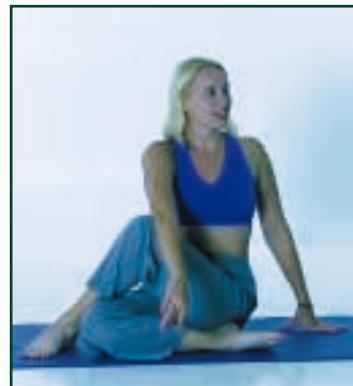
Butterfly Stretch Sit comfortably on the floor with your knees bent, the bottom of your feet pressed together. Gently press your knees down toward the floor. Gently push your knees with your hands or elbows if you need more of a stretch (see



photo). Hold before releasing. You should feel this stretch in your inner thighs and hips..

Back Stretch Stand with your feet hip width apart. Reach your right arm over your head. Gently bend to the left side holding the stretch for a count of ten. Change the stretch by reaching to the side and forward (approximately to an 11 o'clock position) and hold. Repeat on the right side, reaching with your left arm for the side stretch. Reach towards the one o'clock position for the forward stretch. You should feel this stretch in your lower back.

Seated Back Stretch Sit on a mat with your right leg curled around your body and your left leg folded over it. Gently twist your body to the right stretching your back (see photo). Hold for a count of ten and release. Gently twist your body to the left, hold, and release. Switch legs and repeat on the other side.



Shoulder Stretch Cross your right arm over the front of your body and grasp your right arm with your left hand at the elbow. Gently push your right arm towards your body, stretching the shoulder muscles of your right arm. Hold for ten, repeat on the left side. Perform this stretch at least twice on each side.

Upper Back Stretch Clasp your hands in front of your body, palms facing away from you. Push your hands forward feeling the stretch in your upper back and shoulders. Hold for a count of ten. Clasp your hands behind your back, palms facing towards you. Push your hands away from you, gently stretching your upper back. Hold for a count of ten. Repeat both stretches three times.

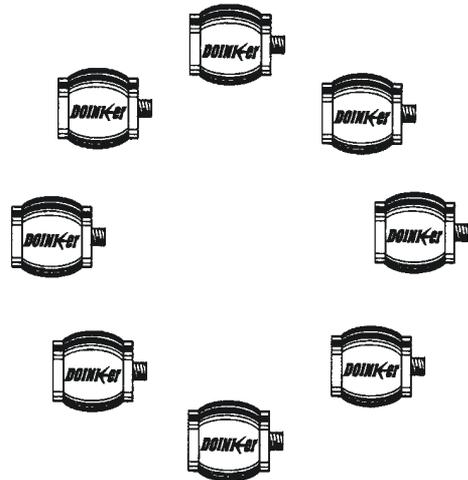
Inverted “V” Stretch Lie on your stomach on an exercise mat with your hands stretched out in front of you. Push yourself up into an inverted “V” (see photo). (You can also enter this position by bending forward from a standing position to form an inverted “V”.) Hold this position for a full minute, stretching your back and legs. Relax into the stretch, concentrating on your breathing. Release and repeat.



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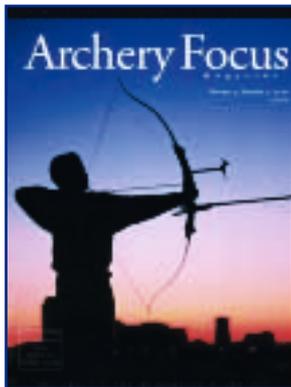


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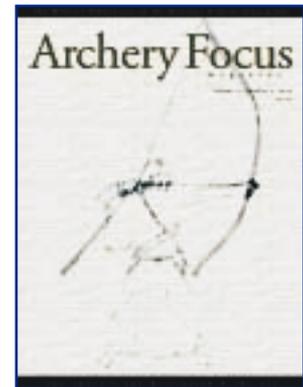


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Annette M. Musta

A Beginner's Fitness Program

This is the first of a three part series presenting complete training programs for all levels of fitness. This beginner's program is appropriate for those who do not participate in a structured fitness program and those who rarely or occasionally participate in a structured fitness program. You should get medical clearance from your doctor before starting any fitness program.

A Beginner's Guide to Fitness

The purpose of this stage is to establish a basic fitness program for archers. This program will benefit your overall fitness which in turn will help with your archery training. This program covers the three main areas of a standard fitness program: cardiorespiratory, strength, and flexibility.

If you are at the beginner's level, your cardiorespiratory endurance is probably low. It is imperative you know how to correctly take your pulse. A good alternative is to purchase a heart rate monitor. A heart rate monitor consists of a watch which you wear on your wrist and a belt you wear around your chest. The belt contains sensors which pick up your heart beat. The information is transmitted to the watch. Heart rate monitors have a number of features. Some features you should look for is time spent in the target zone and an alarm for when you go above or below the target zone. Features you do *not* need are calories burned and fat calories burned. These are unreliable estimates and not worth the extra money.

You can choose any method or mode of exercise. A good starting exercise for beginners is walking. It is an activity that most can do and requires little more than a pair of shoes. If you are trapped indoors in the winter, you can walk on a

treadmill or you can walk around your house. One of my favorite wintertime workouts is a walking program covering the distance from my shooting line to my indoor target.

If you have not exercised before, you will probably be able to get your heart rate in the target zone just by walking briskly. An increase in speed of movement or an incline will increase your heart rate if you need it to get into your target zone.

If you are not a walker you can choose just about any other type of exercise. Recumbent bicycles and stair climbers are a good choices. An elliptical trainer is an excellent choice for those with joint problems in their lower body or for the obese. An elliptical trainer allows you to get a cardiorespiratory workout without placing stress on the joints of the legs, hips, and lower back. Whatever mode you choose, you can achieve benefits from it with a regular program.

The strength elements are designed to get you accustomed to the exercises. Once you have mastered the basics of the movements, you will gradually add weight and sets.

The flexibility elements are an integral part of your program. As you add muscle from your strength and cardiorespiratory program you will need to protect your body. A general stretching and flexibility program will ease the stress on your joints, improve your range of motion, and give your body a reward for all of the hard work you are doing.

The Beginner's Program

This program is a maxi cycle which lasts for four to six months. If you find the first week too easy, skip to the Week Three. This maxi cycle will

require 20-45 minutes of exercise time 4-6 days a week.

Week One - Introduction to Exercise

Monday - This is your first cardio day. Choose your method of cardio exercise, put on your shoes and get out and do it for a minimum of 20 minutes. Go at a comfortable pace. At the end of your cardio session, stretch your hamstrings, calves, quadriceps, back, and shoulders.

Tuesday - This is your first day of strength training. Perform 10-15 repetitions of each exercise without weights, stretch your major muscle groups, and then repeat your set. Concentrate on form and the movement. Do the first set at regular pace (3 counts down, 3 counts up). Perform the second set at half pace (6 counts down, 6 counts up).

Wednesday - Rest day for week one. If you really have the exercise bug, put in another twenty minutes of your cardio program and then stretch.

Thursday - Repeat Monday. Try to push your pace a little harder or faster.

Friday - Repeat Tuesday. Really take the time to get a good stretch in between your sets.

Saturday - Make this a fun fitness day for the entire family or with your group of friends. Go to the neighborhood pool, take a walk with your special someone, play a pickup game of basketball. Just get out and get moving.

Sunday - This is your rest day. Congratulate yourself on starting your program to better fitness.

Week Two - Continuing your Workout

Repeat Week One with the following variation: during your cardio, quicken your pace for thirty seconds and then return to your regular pace. Repeat three times during your twenty minute workout.

Week Three - Increasing the Intensity

If you feel challenged by your current level, repeat week two. If you feel a need to increase your effort, add five minutes to your cardio program each day. Add two more high intensity bursts to each cardio workout. Add a third strength day to your workout week. Make sure you maintain a minimum of 24 hours in between your strength workouts.

Weeks Four through Six - Your Target Heart Rate Zone

Use these weeks to increase your workout intensity. For cardio, quicken your pace. This will be your first time you are aiming for your target heart zone. During your cardio workout include twenty minutes of time in your target heart rate zone. Warm-up at a slower pace for five minutes and cool down for five minutes. See Sidebar below for information on calculating THR.

Add light weights to your strength workout. Start with one to two pound dumbbells in each hand.

Maintain your proper form throughout your exercises. Hold a dumbbell to your chest during the crunches to add resistance.

Weeks Seven through Nine - Adding Time and Intensity

Increase the time you spend in your target heart rate zone to thirty minutes per cardio session. Include your warm up and cool down period.

Increase your dumbbell weights to three to five pounds in each hand. Add a third set once a week at an ultra slow pace (8 counts down, 8 counts up). Breathe in on the contraction phase and out on the relaxation phase.

Add a twenty minutes of stretching on a rest day. Warm-up for five minutes and then perform complete body stretches. Yoga is a good source of whole body stretching.

Weeks Ten through Twelve - Pumping it Up

Keep your target heart rate at thirty minutes per cardio session but add a day of cardio. This should put you at three days of mode cardio per week. Maintain your strength training schedule and resistance. Keep Sunday as your rest day. This gives your body a chance to recover and get ready for another week of exercise.

See Page 12 for a Table Summary of This Exercise Plan

Finding Your Target Heart Rate (THR)

Step One Subtract your age from 220.

Step Two Multiply this number by 0.60. This is the lower end of your THR Zone.

Step Three Take the number from Step One and multiply it by 0.75. This is the upper end of your THR Zone.

Example: $220 - 35 = 185$ then $185 \times 0.60 = 111$ then $185 \times 0.75 = 138.75$ round up to 139. So THR Zone 111-139 beats per minute. To find your heart rate when exercising take your pulse or use a heart rate monitor.

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TWELVE WEEK BEGINNER'S EXERCISE PROGRAM

	Week 1-2	Week 3	Weeks 4-6	Weeks 7-9	Weeks 10-12
Monday	Cardio-20 min/ comfortable pace	Cardio-20-25 min with three intensity bursts/add two extra bursts in week three	Cardio-25-30 min with five intensity bursts/spend 20 min in your THR Zone	Cardio-35-40 min with five intensity bursts/spend 30 min in your THR Zone	Cardio-35-40 min with five intensity bursts/spend 30 min in your THR Zone
Tuesday	Strength Program- no weights/two sets first at regular pace/ second at half pace	Strength Program- no weights/two sets first at regular pace/ second at half pace	20 min of Yoga or whole body stretching	20 min of Yoga or whole body stretching	Cardio-35-40 min with five intensity bursts/spend 30 min in your THR Zone
Wednesday	Rest day	Rest Day	Strength Program-1-2 pound dumbbells in each hand/two sets first at regular pace/ second at half pace	Strength Program-3-4 pound dumbbells in each hand/two sets first at regular pace/ second at half pace	Strength Program-3-4 pound dumbbells in each hand/two sets first at regular pace/ second at half pace/ third ultra slow
Thursday	Cardio-20 min/ comfortable pace	Cardio-20-25 min with three intensity bursts Week Three-Add a strength workout	Cardio-25-30 min with five intensity bursts/spend 20 min in your THR Zone	Cardio-35-40 min with five intensity bursts/spend 30 min in your THR Zone	20 min of Yoga or whole body stretching
Friday	Strength Program- no weights/two sets first at regular pace/ second at half pace	Strength Program- no weights/two sets first at regular pace/ second at half pace	Strength Program-1-2 pound dumbbells in each hand/two sets first at regular pace/ second at half pace	Strength Program-3-4 pound dumbbells in each hand/two sets first at regular pace/ second at half pace	Cardio-35-40 min with five intensity bursts/spend 30 min in your THR Zone
Saturday	Fun Day	Fun Day	Fun Day	Fun Day	Fun Day
Sunday	Rest	Rest	Rest	Rest	Rest

~~Archery Fitness??~~ ~~Archery Fitness~~ Archery Fitness!

by Annette M. Musta

Have you every heard, “I took up archery because I don’t have to be in good shape;” or “Why should I be fit? I’m just an archer.” Should archers be concerned with physical fitness and conditioning? The answer is simple – maximizing your fitness level will improve your shooting, your health, and your life. A well balanced fitness program consists of three elements – cardiovascular conditioning, strength training, and flexibility. Each element is essential to maximize the fitness benefits of exercise. This article provides a brief overview of the elements of a well balanced fitness program and a section on fitness testing so you can establish your current or baseline level of fitness.

Cardiovascular Conditioning

Cardiovascular (cardiorespiratory) conditioning consists of any activity which consistently elevates your heart rate. Activities providing “cardio” conditioning include walking, bicycling, running, rowing, aerobic dance, kick boxing, hiking, trail running, and swimming. The frequency of cardio workouts depends on your current fitness level, the desired outcome, and the duration and intensity of the cardio program. Less intense workouts need to be performed more frequently and for longer periods of time to achieve the same results as a more intense workout. A word of warning, your perception of your level of exertion is not always a good measure of the actual intensity of the workout. You should have a cardio workout at least three days a week to improve cardiorespiratory fitness and to maintain body fat near optimum levels.

Cardio conditioning has too many benefits to ignore. The health benefits include a lower heart rate, lower blood pressure, and decreased risk of coronary artery disease. Weight-bearing aerobic exercise strengthens bones which can decrease the risk of osteoporosis in later years. Any consistent cardio workout will improve body composition. You will burn fat by doing aerobic exercise. Simply put, the only way to lose weight is through aerobic exercise and a sensible diet. Fad diets, supplements, diet pills, and “miracle workouts” are not the answer. If you want the body, you have to do the work. But, with just a few months of dedicated cardio conditioning, you will look better, feel better, and you can start eliminating the “archer’s ballast” around your middle.

Strength Training

Strength training is typically resistance training or weight lifting. Strength training will increase an archer’s stability and endurance. More importantly, when properly done, strength training will prevent injuries.

Archery is a sport of repetition and causes imbalance in the muscles of the body. The bow arm and the draw arm must perform opposing functions repeatedly. Increasing muscle strength in the upper body (arms, shoulders, and back) evens out the imbalance and provides strength for repetitive drawing. The abdominal muscles and the muscles of the lower body (trunk and legs) provide stability during the draw sequence.

A proper strength program should include core exercises incorporating all of the major muscle groups and isolation exercises for specific muscle groups. Strength training can be designed to increase the bulk of the muscles or to tone the muscles. Only a very few people will “bulk up” from strength training. Everyone else will build lean, strong muscles. More importantly, lean muscle mass needs more energy to sustain itself. Your body will burn more calories each day to support your lean muscle mass which means the extra slice of pizza you just ate will not automatically gravitate towards your hips, thighs, and stomach. A good strength program, coupled with a consistent aerobic program will give you a lean, “chiseled” look and a healthy, strong body.

Flexibility

The final element of a well balanced fitness program is flexibility. Flexibility exercises increase the range of motion of the joints, elongate the muscles, provide a warm up and cool down of the body, and decrease the risk of injury. A stretching program should include a series of slow stretches of each body part. Never force a stretch. Never bounce while stretching.

Fitness Testing

Before you begin a fitness program, undergo a physical fitness test to find your current fitness level. A Certified Trainer can perform an extensive test and design a program specifically for you and your sport. The Fitness Test

below allows you to perform your own test and will give you a baseline assessment of your physical fitness.

Fitness Test Warnings

The tests below are designed for reasonably fit and healthy people. As with all fitness information, you should first consult your doctor for clearance before performing or initiating any physical fitness program or training. If you have any of the

conditions listed in the box "Contraindications to Exercise," you must consult your doctor before taking the fitness test or beginning a physical training program.

This Fitness Tests is designed for adults only. Anyone under the age of 18 or over the age of 65 should not take the following test. If you experience the onset of pain, shortness of breath, or any other sudden or extreme physical reaction, discontinue the test and seek medical care immediately. All tests should be performed in the presence of another person.

How Fit Are You? – A Fitness Test

Cardiovascular Fitness

Test One: Cardiovascular Fitness (YMCA Step Test)

Equipment needed – a 12 inch (30 cm) step and a stopwatch
Procedure Step briskly up and down on the 12 inch (30 cm) step using the following cycle: right foot up, left foot up, right foot down, left foot down. Try to maintain a pace of twenty-four cycles per minute. Time yourself for three minutes using the stopwatch. At the end of three minutes, sit

down and find your pulse (Try two fingers on the outside of the neck.). After one minute of rest, find your heart rate by counting your pulse for 15 seconds and multiplying by 4 to get the rate in beats per minute. This is your "recovery heart rate." Compare your results with the chart in Figure 2. Record your level of cardiovascular fitness.



Strength Fitness

Test Two: Upper Body Strength (Push-up Test)

Equipment needed – none

Procedure Men will perform the test in the standard push-up position (only toes and hands in contact with the floor).

Contraindications to Exercise

Check with your doctor if you have any of the following conditions before starting any exercise program or before taking this test.

- High Blood Pressure
- Chest Pain
- A Heart Condition
- Angina
- Dizziness
- Loss of Consciousness
- Bone or Joint Problem
- Any Other Reason Not to Do Physical Activity

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Women perform the test in the modified push-up position (knees bent, only knees and hands in contact with the floor). This test will test the strength and endurance of the upper body including the front shoulder (anterior deltoid), chest (pectorals), and back of the arm (triceps) muscles. The individual performs as many push-ups as they can to the point of exhaustion. There is no time limit but a steady pace and correct form must be maintained. Resting is only allowed in the *up* position. The score is the total number of push-ups completed. Compare your score to the scores in Figure 3. Record your level of upper body strength.

Test Three: Abdominal Strength (Curl-up Test)

Equipment needed – padded flooring or mat

Procedure Perform a bent leg curl-up. This is not a sit-up.



Assume a lying position on the floor, knees bent, feet flat on the floor, hands at sides. Tighten your abdominal muscles and curl your upper torso off of the floor. Hands should move forward approximately 3 inches

and shoulders should be off of the floor. Return to starting position. Perform as many curl-ups as possible while maintaining a steady pace. If the pace is interrupted, the subsequent curl-ups do not count. The score is the total number of curl-ups completed. Compare your score to the scores in Figure 4. Record your level of abdominal strength.

Test Four: Leg Strength (Wall Sits)

Equipment needed – a bare wall and a stopwatch

Procedure Stand two feet away from the wall, facing away, with your feet hip width apart and toes facing forward. Bend at your hips and knees and press your back into the wall as if you were sitting on a chair. Hips and knees should be at a 90° angle. Keep your upper body relaxed and your shoulders lifted. Use the stopwatch to time yourself. Hold as long as you can. Compare your time to the chart in Figure 5. Record you results.

Flexibility Testing

Test Five: Lower Body Flexibility

Equipment needed – none

Procedure Sit upright on the floor with your legs extended in front of you 12 inches (30 cm) apart, feet flexed, toes pointing to the ceiling, do not lock your knees. Breathe in, then as you breathe out reach your hands forward to your toes. Do not bounce, do not stretch your neck to increase your distance. Reach as far forward as you com-



fortably can. Have another person mark the distance you reach from the tip of your fingers to your toes. Compare your results to Figure 6.

Test Six: Shoulder Flexion

Equipment needed – none

Procedure Stand upright, back straight, abdominal muscles in, knees bent slightly. Reach towards the ceiling with your right arm, bend your elbow and drop your hand over your shoulder.



Bend your left arm at the elbow and reach up behind your back. Slowly move your hands toward each other, try to make your fingers meet. Mark how close your hands are to each other. Repeat with the other side. Compare your results to those in Figure 7. Record your results.

Your results represent your baseline level of fitness – the starting point for your fitness program. Any score in the *poor* or *fair* categories indicates an area you need to work on extensively. A score in the *good* category indicates a higher level of fitness that can be improved with a little extra work. An *excellent* rating indicates a high level of fitness that must be maintained.

Repeat the test every three months and watch your improvement as you exercise to better health. ♣

Note See page 13 for all Fitness Test Tables.

Annette Musta is a certified personal trainer who owns and operates her own business, ARH Sports and Fitness in Pennsylvania. She has been shooting for 24 years, but not seriously (she says) until the last five years. She has been a professional ballet dancer (which is why she is known around the ARCO Training Center as “the dancer”) and is currently a licensed pilot. She is the founder and Executive Director of the Pass the Torch Foundation, which matches school age children with athletes training for international competition.



Figure 1 Recovery Rates for the Three Minute Step Test

Age(years)	18-25		26-35		36-45		46-55		56-65	
	M	F	M	F	M	F	M	F	M	F
Excellent	>89	>98	>89	>99	>96	>102	>97	>104	>97	>104
Good	90-105	99-117	90-107	100-119	97-112	103-118	98-116	105-120	98-112	105-118
Fair	106-128	118-140	108-128	120-138	113-130	119-140	117-132	121-135	113-129	119-139
Poor	<128	<140	<128	<138	<130	<140	<132	<135	<129	<139

Figure 2 Upper Body Strength - Push-up Test

Age(years)	18-25		26-35		36-45		46-55		56-65	
	M	F	M	F	M	F	M	F	M	F
Excellent	>29	>21	>22	>20	>17	>15	>13	>11	>11	>12
Good	22-28	15-20	17-21	13-19	13-16	11-14	10-12	7-10	8-10	5-10
Fair	17-21	10-14	12-16	8-12	10-12	5-10	7-9	2-6	5-7	1-4
Poor	<16	<9	<11	<7	<9	<4	<6	<1	<4	<1

Figure 3 Abdominal Strength

Age(years)	18-34		35-44		45-65	
	M	F	M	F	M	F
Excellent	>60	>50	>50	>40	>40	>30
Good	45-59	40-49	40-49	30-39	25-39	15-29
Fair	30-44	25-39	25-39	15-29	15-24	10-14
Poor	<30	<25	<25	<15	<15	<10

Figure 4 Leg Strength

Level of Fitness*	Beginner	Intermediate	Advanced	Expert
Excellent	>50	>80	>120	>160
Good	40-49	60-79	100-119	140-159
Fair	30-39	50-59	80-99	120-139
Poor	20-29	40-49	60-79	100-119

***Level of Fitness** *Beginner* - Never exercises or is over 50
Intermediate - Exercise intermittently (at least in past year)
Advanced - Regularly exercises 3-4 times per week
Expert - Exercises daily

Figure 5 Lower Body Flexibility

Excellent	Fingers reach 1 inch or more past the toes
Fair	Fingers reach or almost reach toes
Poor	Fingers are more than five inches from toes

Figure 6 Shoulder Flexion

Excellent	Fingers interlock
Fair	Fingers touch
Poor	Fingers are more than three inches apart

Strength Training Those “Archery Muscles”

by Annette M. Musta

A properly executed archery shot recruits many muscles of the upper and lower body. The muscles of the shoulders and back are the primary draw muscles. The muscles of the arms and chest are accessory muscles. The muscles of the abdomen, lower back, and legs provide stability throughout the draw sequence. Strength training these muscle groups will improve your shot. You will notice an increase in your endurance during long competitions or practice sessions and the ability to perform a proper draw sequence without excess physical stress, thus improving your shot, your groupings, and your score. You will also have a more well-developed physique, so you will look good while you are shooting.

Strength Training Goals for Archery

The goals of strength training for archery are an increase in muscle strength and endurance. The principle physiological factor behind a strength training program is the *overload principle*. A muscle needs to be properly challenged, or overloaded, to achieve results. Proper strength training programs are designed with specific overloads to cause specific strength gains to specific muscle groups. Some factors are beyond the control of the individual, for example, the type and distribution of fibers in the muscles you target (which are determined genetically). A strength program consists of combinations of resistances and repetitions. Resistance is typically the amount of weight used. Repetitions are the number of times the exercise is performed. A group of repetitions is called a set.

Your body will make several adaptations to strength training. The muscles trained will increase in size (called hypertrophy), their connective tissues will increase in strength, their blood supply will increase to feed the new tissue, and their nerve supply will improve. More important for over-all health and fitness, muscle tissue burns

more energy than other tissue and this increases your overall metabolism. An increase in metabolism leads to an increased need for fuel. A strength training program,

Repetitions and Sets for Strength Training Exercises		
Level	Repetitions	No. of Sets
Beginner	6-8	1
Intermediate	8-10	2
Advanced	10-14	3+

Table

combined with aerobic conditioning and a sensible diet, will lead to weight loss.

Strength training should always be preceded by a warm-up session of ten to fifteen minutes duration. The ‘warm-up’ should include at least ten minutes of light aerobic activity (walking in place, stair climbing, etc.) and a light stretch of the muscle groups to be worked. Strength training should be performed every other day to allow the muscles and connective tissue adequate recovery time. It is important to perform different exercises for the same muscle groups to completely work the muscles and to postpone the adaptation process. Learn each exercise without weights to perfect your form. Poor form leads to injuries. Perform each exercise using only the target muscle. Do not swing the rest of the body to complete the ‘rep.’ Start with the minimum weight, repetitions, and sets recommended. A little muscle soreness is expected, especially if you are new to strength training. Muscle soreness that lasts for more than a couple of days or is sudden and severe and accompanied by swelling, redness, or bruising indicates a potential injury and should be examined by a doctor.

A Strength Training Program for the “Archery Muscles”

The primary muscles in a properly executed archery draw are the muscles of the shoulders and the upper back. The archery muscles of the shoulder are the *deltoid* muscles - the *anterior*, the *medial*, and the *posterior*. The archery muscles of the upper back are the *latissimus dorsi*, the *trapezius*, and the *rhomboids*. Accessory muscles are the *teres major* and *minor*, the *scapularis*, the *spinatus*, and the *serratus*. The major opposing muscles are the *pectoralis* (the muscles of the chest). (Whew!)

The following is a basic strength training program for the major archery muscles of the shoulder and back. Each

movement should be practiced without weights to perfect your form. Use the chart below for repetitions and sets. Rest 48 hours in between each weight train-

ing session.

Equipment Needed Two 1 to 3 pound dumbbells (Note: two cans of soup can be substituted for the dumbbells.), an exercise bench or chair

Exercise Side Raise

Muscles worked medial deltoid

Stand with your legs hip width apart, abdominals (stomach muscles) contracted, your arms at your sides, a dumbbell in each hand. Slowly (count of three) raise the arms straight out to the sides only to the height of the shoulders. Lower slowly. This is one repetition.



Exercise Front Raise

Muscles worked anterior deltoid, pectorals

Stand with your legs hip width apart, abdominals (stomach muscles) contracted, your arms at your sides, a dumbbell in each hand. Slowly raise the arms straight in front of you to shoulder height. Lower slowly for one repetition.

Exercise Military Presses

(Warning – do not perform this exercise if you have high blood pressure or a lower back problem)

Muscles worked anterior, medial and posterior deltoids, trapezius, triceps

Stand with your legs hip width apart, abdominals contracted, a dumbbell in each hand. Lift the weights to shoulder height with your palms facing forward. Slowly press the dumbbells to arms length above your head, pause, then slowly lower them to shoulder height to complete one repetition.



Exercise Upright Row

Muscles worked trapezius, anterior deltoids, triceps

Stand with your legs hip width apart, abdominals contracted, your arms at your sides, a dumbbell in each hand with your palms facing back. Slowly bend elbows and raise



Exercise Back Raise

Muscles worked posterior deltoid, rhomboids

Sit on the edge of an exercise bench or chair with your feet flat on the floor, bend forward at the waist over your legs, contract your abdominals (stomach muscles), with your arms at your sides, a dumbbell in each hand. Retract the scapula (the shoulder blades). Slowly raise arms out to the sides to shoulder height. Lower slowly to complete one repetition (photo top of next column).

continued next page

the dumbbells in front of your body to chest height. Pause. Slowly lower dumbbells back to the starting position to complete one repetition.

Exercise Shrugs

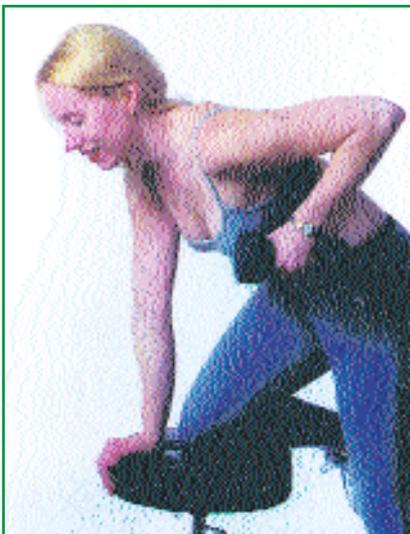
Muscles worked trapezius, rhomboids

Stand with your legs hip width apart, abdominals contracted, arms at your sides with a dumbbell in each hand. Slowly raise your shoulders, keeping arms at sides. Roll the shoulders back then down to the starting position to complete one repetition (no photo).

Exercise Single Arm Rows

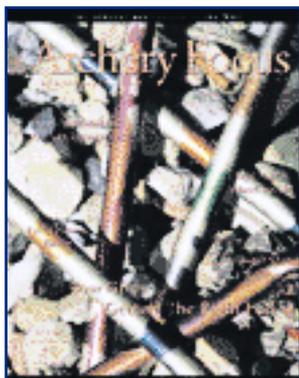
Muscles worked latissimus dorsi, biceps

Stand with your left knee and hand on your exercise bench, right arm extended towards the floor, a dumbbell in the right hand. Slowly pull the dumbbell towards your chest, leading with your elbow, keeping your arm close to your body. Pause then lower the

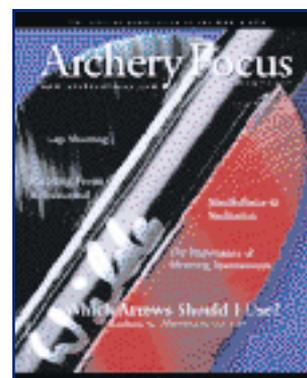


dumbbell back toward the ground to arm's length. This is one repetition on the right side. Complete a set on the right side then switch to the left side (right knee and hand on the bench, left arm extended with a dumbbell). Alternate sets on each side.

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Dr. Jeff Marsick

Archer's Tennis Elbow

In a recent survey of common injuries plaguing archers, the number two villain behind shoulder pain was elbow pain. Some of you may have noticed an ache or tenderness on the outside of your elbow after only a few shots, while others may not be able to pull the bowstring back at all because of the pain. What you may have is a case of tennis elbow. Fortunately, with a few easy exercises and a modification to your pull, you'll be back on the range in no time.

What is Tennis Elbow Exactly?

Tennis elbow, or lateral epicondylitis as it's called in medical-ese, is tenderness and pain on the outside (called the lateral side) of the elbow, specifically in the band of muscles that cross over the elbow joint to connect into the upper arm (the humerus). These muscles are called extensors, as their job is to pull your wrist backwards (extension) as if you were holding a tray overhead. Tennis elbow is an easy condition for tennis players to encounter since swinging a tennis racquet involves pulling the racquet powerfully backwards before swinging forward. In archers, the main cause is by not exclusively using your large, powerful muscles to draw the bowstring, but bending the wrist as you pull your elbow back.

Keep in mind that there may be other causes of the elbow pain: cervical spine problems brought on by poor posture, compression of the radial nerve as it travels down to the muscles in the wrist and hand, or degeneration of the joint between the radius and humerus bones. A couple of simple tests can be used to determine if you have tennis elbow: 1) Stick your arm straight out in front of you, palm down. Have someone push gently down on your wrist while you try to bend it backwards. Pain will occur at your elbow if you have the condition; 2) In the same position as

number 1 with your palm facing down, gently pull your wrist down to stretch the back of your forearm. There won't be much flexibility in your wrist and there may be pain at the elbow; 3) Again, in the same starting position, with the palm down, have someone push against the back of your fingers while you try to push them up to the ceiling. Again, pain will occur at the elbow if you have the condition.

What I discuss in this article is directed towards tennis elbow specifically and should improve your pain. If it does not, an x-ray may be needed to rule out arthritic changes in the joint.

How to Correct It

It has been my experience that the majority of problems with athletes and their sports is corrected by using proper form. So the first thing you should do is have someone watch your form and make sure that the back muscles are doing the work and that your wrist is not bending backwards as you draw on the string.

Next is rest and ice. You are only allowed to work and shoot with that elbow as long as you do not cause an increase in pain. Use an ice pack for 10-15 minutes on the area, 2-3 times a day. Even better is to take a dozen Dixie cups, fill them with water and put them in the freezer. When frozen, rip off a little bit of the paper and give the area an ice massage for about 8 minutes, until it goes numb. Do this 2-3 times a day. Keep the ice handy, because after you do your exercises, you're going to ice the elbow down.

I'm a big fan of Therabands or rubber tubing to do the exercises with. If you don't have them, very light dumbbells will also work. Once you can hold your arm straight out and push your wrist up against someone pushing down without

seeing stars from the pain, then you can start using the Therabands or dumbbells.

Extensor Stretch

Hold your left arm straight out in front, with your palm down. Keeping that elbow straight, reach across with your right hand and gently pull down on the back of your left hand. You should feel a stretch down the back of your arm and across your elbow. Hold the stretch for 30 seconds, then relax and do the same on the other side for 30 seconds.

A variation of this is to gently push up with the back of your left hand against the resistance, counting to seven, then relax and let the right hand stretch the left. Repeat this three times.



Wrist Extensions

Sit with your arm stretched out in front of you, palm down, your elbow supported on a table or desk. Tie the Theraband around your foot and hold the other end in your hand, or use a light weight (*pictured below*). Pull your wrist backwards like you're revving a motorcycle. Hold it at the top for a count of two, then slowly lower your hand, counting to five. Do this twelve times.



Rope-Ups

This is a great exercise for strengthening your wrist extensors, but not one to attempt unless you have a full range of motion that is relatively pain-free.

For this you need a bar, a piece of rope as long as you are tall, and a light weight. Tie one end of the rope around the bar, the other end through the weight. Standing or sitting with your arms outstretched and your



elbows supported, roll the bar in your hands, winding the rope up and lifting the weight all the way up to the bar. Once at the top, go in reverse, slowly lowering the weight to the floor. The key here is to get a full range of motion in your wrists while keeping your elbows straight: bend your wrist all the way down to turn the bar up, and bend it all the way back before the other wrist bends forward to grab the bar and pull it up.

Consistency is the Key

An effective elbow rehabilitation program starts with a consistent exercise routine, stretching before and after shooting, with ice and rest important for repair and recovery. While this article demonstrates the exercises with light weights, always start with therapeutic bands or tubing, exercising in a limited, pain-free range of motion, building to a full range as the pain subsides. If at any point the exercises cause an increase in pain, notably one that does not go away with rest, immediately stop and reassess your motion. I always encourage the use of mirrors or video cameras, so that you can actually see what the muscles are doing and if your form can be improved.

Also, if after a trial of exercise and rest the pain is getting worse or simply not improving, make an appointment to see an orthopedist or chiropractor to rule out something more serious.

Dr. Jeff Marsick is a Certified Chiropractic Sports Physician and nutritionist in private practice in Fairfield, CT. A former Coast Guard officer, he also has a background as a personal trainer. Self-taught, he has been shooting off and on for seven years, but soon hopes to start shooting competitively. . . lessons might not be a bad idea, either.