

Beyond 2007

Vertical-Jump Testing:

What better example of jumping power than this photo of 14-year-old Mary Beth Lofgren? Mary Beth, who represents the Olympus School of Gymnastics in Sandy, Utah, won the 2007 Utah State Championships and then placed 8th in the Junior Nationals. (Photo by Dean Atkins, Timeless Images Photography, Inc., www.timelessimages.com)

A simple, super fast solution to sports fitness testing

by Kim Goss

When I was a strength coach at the Air Force Academy in the late '80s and early '90s, I dreaded sports fitness testing for our football team. It's not that I didn't believe that testing was important but that our testing program reduced the amount of time we could devote to getting our athletes bigger, faster and stronger.

Our entire battery of tests, which included popular standards such as the 40-yard dash and the 20-yard shuttle, was performed twice a year – plus an intense running test that involved running three consecutive 440s with a one-minute rest between runs. The thing is, with the large number of athletes we had to deal with, the entire ordeal took the good part of a week, not including make-up tests for those cadets who missed the tests because of illness, injury and their seemingly countless military commitments. And while we strength coaches were supervising all this testing, we couldn't be in the weightroom explaining to our freshmen the difference between a reverse curl and a power clean.

Another problem with all this testing is that when athletes knew they were going to be tested, they would often slack off in the weightroom. This was especially true with the 40, as it was the test that the football coaches put the most emphasis on. So if an athlete knew they were going to run the 40 on a Friday, they would try to skip squats the entire week or



Upper body power can also be accurately measured with the JJR with a plyometric push-up. Here the athlete puts her hands on two low platforms between the force plate, then drops into a push-up and then springs back to the platform.



Muscular endurance and anaerobic power can be assessed on the JJR with a 60-jump test. In this variation, Chloe jumps side-to-side, as fast as possible while the computer not only counts the repetitions, but also records how long the athlete spent on the platform during each jump.



The JJR system is valuable for injury prevention because it enables you to test jumps on one leg as well as on two legs. A muscle imbalance between legs may place an athlete at a high risk of injury.

athletes often find ways to shorten their reach, such as by not extending their shoulders or spine. Interestingly, I found that by keeping private records of the standing reach measurements, for some reason it appeared that some of our cadets were getting shorter over the course of their college careers!

Next comes the question of sports specificity. With the exception of basketball, how many sports require you to jump in the air with one arm outstretched overhead? According to Wahl, the vertical jump is a very sport-specific test for hockey; actually, it would be more relevant to hockey skating to perform the test with your hands at your sides. With our force plate, you simply jump as high as you can and the computer determines your vertical jump based upon how long you were airborne – no standing reach measurement is necessary, and you can place your hands anywhere.

According to Wahl, a coach should consider not only the position of the arms but also the type of knee bend (what he refers to as the “stretch shortening cycle”) that should be tested. For example, prior to moving to Salt Lake City in 2004, I had a private gym where my primary clients were figure skaters. Figure skaters, as a whole, have pathetic vertical jumps: I even heard of one study performed at the Olympic Training Center which found that the only group of athletes the figure skaters could out-jump were the Ping-Pong players! Further, if you match a group of shot-putters to a group of high jumpers, you’ll often find that the shot-putters will have better results in the Sargent test. The difference is the stretch shortening cycle.

During a traditional Sargent test your best results come by starting with a relatively slow and deep knee bend, much like the initial movement with

the shot put. With the high jump and figure skating jumps, the athlete needs to be able to transfer horizontal movement to the vertical, and the knee bend is relatively shorter and faster. So a better vertical jump test would be to take a step and jump, or perhaps perform the jump from a slight drop off a platform. The plyometric function of the BFS force plate allows you to measure this type of jump.

This plyometric function can also apply to testing upper body power. By placing your hands on an elevated platform, you can perform a “plyometric push-up” and determine ground contact time. The shorter the amount of time you spend on the mat, the greater the power. If an athlete has a low score, then additional plyometric training, such as medicine ball throws, would be advised. A similar test would be to throw medicine balls for distance, but a test using a mat is certainly quicker to administer and easier to measure accurately.

Another important test for many sports is jumping high several times in succession. In basketball, for example, I believe it was track coach Dr. Donald Chu who said that the rebound – especially at lower skill levels – often doesn’t occur with a single jump, but on the second or third. Also, this can be a good test to measure reactive ability, a component of acceleration. With a BFS force plate, you can measure four consecutive jumps, see how much of a drop-off there is between jumps and determine if this is an aspect of training that must be addressed.

Another test is muscular endurance. I found that with the 440 running test, those who performed best in the 90-second box jump test performed best in this test. A 60-count JJR test can measure muscular endurance, as it can count the number of jumps for

use the lightest weights possible to “peak” for the sprint (and avoid hamstring pulls).

Why bring up these old concerns years later? My point is that testing should help an athletic program but should not become such an obsession that it interferes with training – it’s like taking a test at school but never being allowed to study for it. And this is a shame, because athletic testing can be used to help guide an athlete’s training.

To make testing easier, BFS offers a force plate that significantly decreases the amount of time needed for testing an athlete’s ability to jump and run – two basic athletic qualities. We call this device, which consists of a 28" x 28" jump pad and a handheld computer, the Just Jump and Run.

Now I’d like to discuss the best types of jump measurements for specific sports.

The ABCs of Jumping

Michael Jonathan Wahl is a Ph.D. candidate in sports training specificity who works with numerous world-class athletes at his Definitions Fitness Company in Newfoundland. Wahl says a number of studies have demonstrated strong correlations between vertical-jump performance and acceleration, and this essentially is the quality that



With the BFS Just Jump and Run (JJR) testing system, you simply jump as high as you can and the computer determines your vertical jump based upon how long you were airborne – no standing reach measurement is necessary. Here Senior VP Rick Anderson tests the newest version of the JJR, which became available this summer, on gymnast Chloe Van Tussenbroek at the BFS Headquarters in Salt Lake City. Note how you can jump with your hands at your side, making the test more specific for sports such as hockey.

the vertical-jump test measures: “The vertical jump tells you how quickly an athlete can start movement and apply force. It’s equivalent to that first step in tennis, that explosion off the line of scrimmage and that leap out of the starting blocks,” says Wahl.

The basic vertical-jump test is the Sargent Jump Test, named after Dr. Dudley Sargent, which dates back to 1921. It involves determining how high you can reach with one hand (usually by placing your hand on a wall) and keeping your feet flat, then without taking a step jumping as high as possible and measuring the difference between the two heights. If you had a difference of 25 inches, then you would have a 25-inch vertical jump.

The cheapest way to perform the Sargent test is to perform it against a

wall, putting chalk on your hands to determine your reach and your highest jump. The next major evolution of this test is to hit a series of plastic tabs set at ½-inch increments; the more tabs you hit, the higher your score. What is a good score? As a starting point, a typical active 17-year-old girl would jump about 13 inches and a typical active 17-year-old boy about 20 inches. When you start looking at college athletes, then females should be approaching 20 inches and males 30 inches.

One problem with the Sargent test is that it is easy to cheat – not so much in how high you jumped (although with the pole device you could often get a few extra tabs by slapping it hard and upward) but with the starting point for the reach. Truth be told,

The plyometric function of the JJR enables you to test many variations of depth jumps. Such jump measurements are more specific to sports such as the high jump and figure skating, as they involve a horizontal component. Shown testing Chloe is Canadian strength coach Paul Gagné, who uses the JJR to test his athletes.



a specific time limit and the height of each jump – so it also records the quality of the jumps, a measurement often referred to as anaerobic power.

Vertical-jump testing is also valuable for rehabilitation. I tested one athlete who, after knee surgery and physical therapy, had a 22-inch vertical jump, which is great but also had an 8-inch difference in how high she could jump with one leg. Wahl believes that muscular imbalances, not just between muscle pairs (such as quadriceps and hamstrings) but also between limbs, may place an athlete at a high risk of injury. For this gymnast, performing single-leg exercises, such as lunges, might be appropriate.

Putting Testing to the Test

Here's an example of how I put vertical-jump testing to practical use. This past year I started working with gymnasts, and I found that there is often little difference between jumping with a step and jumping from a standstill.

Chloe Van Tussenbroek is a 14-year-old, Level 10 gymnast from the Olympus School of Gymnastics with whom I started working last year. After a few months of working with Chloe, I tested her vertical jump in January; it was 22 inches. Within four months (Jan. 23 to May 18) she improved to 26 inches, which is a heck of a jump; she could also jump 17.5 inches with her right leg and 16.5 with her left. However, Chloe's

best result in jumping with a step was 26.5 inches, which is surprising low, relatively speaking (often I'd see a 3-4 inch difference with other athletes). But I found that Chloe was not unique in this regard, and in fact many gymnasts I tested jumped lower when they took a step!

This phenomenon occurs, says Wahl, because gymnasts use only their own bodyweight in their sport and therefore do not sufficiently overload the eccentric movement. This lack of eccentric strength means the athlete may not be able to jump as well when performing multiple jumps and could also increase their risk of injury,

as they do not effectively control the force of landing. Therefore, exercises such as squats with a slower eccentric movement, or squat jumps with a Hex bar (just clearing the ground, not jumping high), would be appropriate supplemental jump training for these athletes.

Testing can be a valuable tool, especially for monitoring training and motivating athletes to achieve higher goals. And if you know which tests are appropriate and you have the proper testing tools, the process doesn't have to be an ordeal. **BFS**



Chloe Van Tussenbroek is Mary Beth Lofgren's teammate and placed 2nd to her this year in the Utah State Championships. Chloe is 14 years old and is also a competitive dancer, focusing on ballet and hip-hop. Chloe has a 26-inch vertical jump and has also modeled for several training articles in *BFS* magazine. (Photos by Preston Norris Zone VII Photography).



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