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FREE WEIGHTS VS. MACHINES

Which Are Better?

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That Foil Your Workouts





DAVID STOECKLEN

A Weighty Dis



JERRY WACHTER

The first weight-adjustable barbell was made in the US in 1902, and for 50 years, training with the barbell was arguably the single most popular and productive way of performing progressive weight training. In an attempt to “build a better barbell,” Arthur Jones designed the first Nautilus machine—a pullover torso device—in 1948 (although he did not begin selling his machines until 1970). During the 1950s, Universal introduced its line of easy-to-adjust weight machines. The groundwork had been laid for future advances in weight training, advances that would revolutionize the way people thought about exercise.

The fitness boom of the '70s fueled the emergence of exercise machinery. After many years of “growing pains,” today's



DAVID STOECKLEIN

pute

By Matt Brzycki

Which are better, free weights or machines? The air is thick with opinions, including this one from a seasoned strength-training coach.

equipment has come a long way from the sandbags and Indian clubs that preceded the first adjustable barbell. Today, machines offer resistance via steel plates, hydraulics, pneumatics, motors, and even water. Machinery interfaced with computers is becoming increasingly common—one company markets exercise machines that can talk to you with a 1,000-word vocabulary!

Out of this progress has come a raging controversy, sometimes bitter and always emotional. Many weight-training machine manufacturers claim that their products are superior to free weights. Free-weight proponents, on the other hand, contend that machines are glitzy gimmicks, and certainly not for anyone serious about training with weights. Ma-



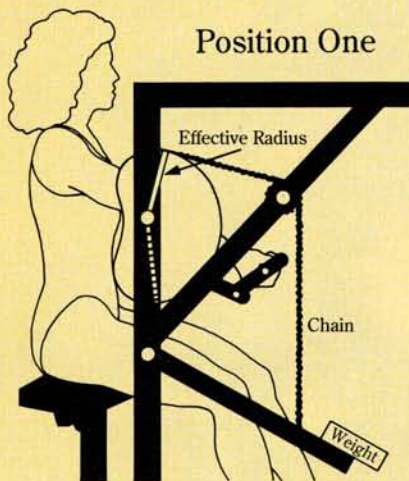
DAVID BROWNELL

chines, they claim, can't produce the results that free weights can. The banter between both camps is continually heard in gyms and clubs across the country.

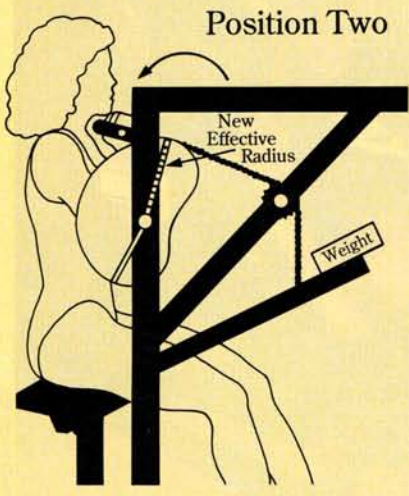
Which *are* better for weight training—free weights or machines?

Diagram 1

How the "variable resistance" cam works.



The cam is used by several exercise machine manufacturers to vary a machine's resistance to match the changes in leverage. As you perform an exercise, the cam rotates. In this example, the weight trainer's strength is low at an early portion of a repetition (position one) and higher at a later portion (position two). In position one, the length of the effective radius is relatively small, so the resistance is low; as the exerciser's leverage (and strength) increases toward position two, the chain winds around the cam and the effective radius becomes larger, causing the resistance to increase. The result is a greater muscular effort throughout the exercise's range of motion.



THE FREE-WEIGHT ARGUMENTS

More often than not, the argument originates from the free-weight user, and it usually boils down to two assertions. The first goes something like this: Machines merely tone or shape muscles while free weights are better for building strength and muscle size.

Is this true?

To get to the answer, you must understand what builds a muscle's strength and size. It isn't complicated. First, you need to apply a resistance (load) to a muscle, and second, the resistance must increase from one workout to the next. Does it matter whether the resistance comes from a barbell or a machine? No. Twenty pounds is 20 pounds, and that's all your muscle knows. It doesn't care whether it comes from a suitcase or sandbag. So does this first argument hold water? No. Your muscles won't respond a certain way with barbells and another way with machines.

The other argument is that free weights are better to use if you're training for a particular sport. That is, with free weights, you can do body movements similar to the movements in your sport, movements that will help you learn and improve your motor skills in that sport.

Unfortunately, weight training research literature provides little to support this, and in fact documents what is called the Principle of Specificity, which weakens the argument. The principle simply states that you must do a skill over and over for maximal improvement to occur—but it must be the exact skill, not a similar one.

In other words, a barbell squat may be similar to a vertical jump, and a power clean may be similar to a rowing motion, but barbell squats will only help you get better at doing barbell squats and power cleans will only help you get better at doing power cleans. There is *no* exercise done in the weight room—with a barbell or a machine—that will help you learn sports skills.

Rutgers' Sue Wicks, the 1988 Player of the Year in women's basketball, was one of the top scorers, rebounders, and shot blockers in the country without ever having done a barbell squat or a power clean. Quite simply, she got good at basketball by playing basketball.

That nixes the free-weight proponent's second claim. The simple fact is that, on physiological and sports-specificity grounds, free weights are not inherently better than weight machines. Of course, in these two areas, neither are machines better than free weights.

THE PLUSES AND MINUSES

But there are other areas to consider that favor either free weights or machines, so let's investigate further.

Proper fit. The edge here goes to free weights, where it can truly be said that one size fits all, from the tallest basketball players to the tiniest gymnasts. Some machines, however, can't accommodate the extremely tall or short, or those with very long or short limbs. Some of the shorter



Rutgers gymnasts—barely five feet tall—simply don't fit on some machines. Nor will many adolescents.

Safety. This factor tends to favor machines (but don't think you can't get hurt while using them if you aren't careful). Any barbell exercise that involves lifting a weight over your head (such as a bench press or a shoulder press) should only be done with somebody watching you, because it's possible to get pinned underneath a bar or to get stuck with a weight in a compromising position. It's almost impossible for such things to happen with today's machines. Some manufacturers also place plastic or metal shields around the machines' moving parts to prevent fingers and clothing from getting caught.

Time. Most people don't have a lot of time to spend in the weight room. Workouts are generally quicker when using machines. The resistance on machines can be set simply by moving a pin rather than fiddling around changing weight plates. On some of the latest machines, you can change the resistance by as little as an ounce merely by touching a button!

Proper resistance. In some portions of a given weight exercise, you're stronger and can handle more weight, while in other portions you're weaker and need less weight. This is because at some stages in an exercise your leverage is better. For instance, in a typical bench press (where you lie on your back and lift a bar up from your chest), you gain leverage (and therefore strength) as you extend your arms away from your chest. That is, the weight feels heavy near your chest and

lighter as you move it away.

Ideally, your muscles need resistance that changes to meet your existing level of strength throughout an exercise. With such a varying resistance, your muscle works equally hard throughout the exercise, rather than working hard at one stage



and coasting through another.

Free weights do not give you variable resistance, while many machines do—and that is one of the biggest advantages of machines over barbells. Some machines—Nautilus machines, for example—use a kidney-shaped “cam” to vary the resistance (see diagram 1), while others, like some Universal equipment, use other designs.

Because of variable resistance, workouts with machines that offer it are more efficient than workouts with free weights. During a typical barbell exercise, there's adequate resistance for your muscles in their weakest positions, but not enough in their strongest positions. The bottom line is this: if you work out with a variable-resistance machine, you will gain strength more quickly than if you work out with free weights.

It should be mentioned, however, that there are a few free-weight exercises that provide adequate resistance through most of the movement. These are forearm curls, shoulder shrugs, and calf raises. Also, free-weight adherents claim that because machines have to be geared to the “average person,” their variable resistance patterns are ill-matched for some exercisers who don't fit the average mold. While this criticism is valid, the fact is that the machines' patterns fit almost all exercisers, and the exceptions are very few.

Exercise efficiency. Machines generally provide resistance over a greater range of motion compared to a similar free-weight exercise. The Nautilus pullover machine is a good example (for those familiar with

it). It provides resistance over nearly a 270-degree range of movement around the shoulder girdle area (the “lats”). In comparison, a barbell pullover only provides about 100 degrees of resistance for the same shoulder muscles (see diagram 2).

This holds true for just about all machine exercises in comparison to their free-weight counterparts.

Stretching. Many free-weight exercises do not provide your muscles with an adequate stretch. For instance, a barbell bench press restricts the stretching of your chest muscles—you might be able to stretch much farther but you're unable to because the bar must stop at your chest. Almost all machine-type bench presses utilize movement arms with an opening for your chest. This enables you to obtain a better stretch so that you don't compromise your flexibility. (Performing free-weight exercises with dumbbells will also allow you to get a better stretch, however.)

Rehabilitation. Machines rate a definite edge here. Suppose you injure your left knee. Many free-weight exercises would be quite difficult or uncomfortable (or downright impossible) to perform. However, you could still train your entire upper body, your right leg, and possibly even both hips if you have access to certain machines. In this way you can prevent your muscles from atrophy. You could even continue to train on most machines with a fair amount of comfort even if an arm or a leg was placed in a cast!

SO WHICH ARE BETTER?

If I were pressed to the wall and forced to say whether machines or free weights were better, I'd say machines were, for the reasons outlined above—they provide a safer, more efficient workout. And I'm not someone who has always worked out with machines. I started out with barbells, and even competed as a powerlifter with them for many years. Machines simply provide more advantages.

But I'm not saying to quit working out with free weights and run to the machines. The type of equipment is not as important as how the equipment is used, and obviously barbells can produce terrific results. I use both, and enjoy the variety. Some people prefer free weights and others favor machines, and there's nothing wrong with that.

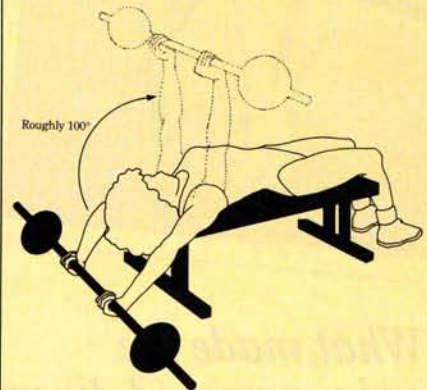
At Rutgers University, we allow our athletes to make their own choice—we don't force a barbell or a machine on anyone. For instance, while at Rutgers, Sue Wicks preferred doing her bench presses with free weights; gymnastics captain Monica Tilton does her bench presses almost exclusively on a machine. Remember, the muscles do not respond one way with barbells and another way with machines.

So, keep an open mind when you decide

what type of equipment to train with. If you don't have a preference, choose the most convenient, or vary your workouts with barbell exercises *and* machines. Remember, variety is the spice of life!

Matt Brzycki is an assistant strength coach at Rutgers University, where he works extensively with many of the women's teams.

Diagram 2
Machine pullover versus barbell pullover.



With the machine, the exerciser faces resistance to her muscles in the shoulder girdle area through nearly 270 degrees, while with the barbell exercise, resistance against those muscles stops after 100 degrees.

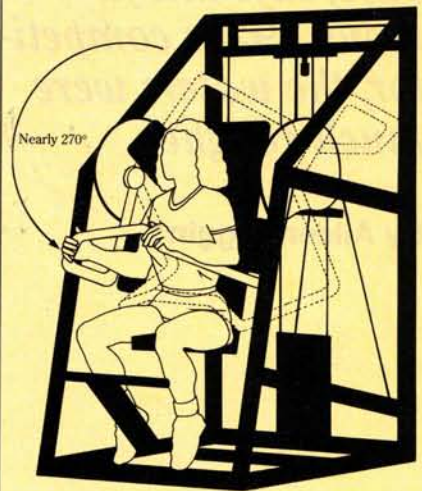


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