

# The 1.5%-Per-Week Rule

## Part 1: Fat Loss

By Craig Horswill, PhD, Sr. Research Fellow, Gatorade Sports Science Institute

**A**t the beginning of each wrestling season, frustration rises when coaches can't field a complete line-up because of weight class rules of the minimal weight program. Established by the sports medicine community and implemented by the NCAA, NFHS and state associations, the program uses hydration testing and body fat assessment to control the rate at which weight can be lost: no faster than 1.5% per week. The time between the end of football playoffs and the first match may be too short for a 291-lb heavyweight to slip into his lower mass – 2% lighter – and join the Varsity line-up.

Frustration aside, many coaches don't understand the basis for this rule, particularly when they've seen wrestlers lose between 4 to 6% of body weight in a single 2-hour practice. What's the deal?

### Like Vinegar and Oil

Years ago at the end of a wrestling practice, I recall one of my wrestling coaches say, "Guys, try not to drink anything for an hour or so after practice. Let's see if we can break down some fat." The misconception implied in the coach's statement was that there is a lot of water stored in fat. If we deprive our body of water after a hard sweaty workout, the body will break down fat to find water to rehydrate itself.

Interestingly the body will do this to some degree, but fat cells are not the source of water. Fat cells contain relatively little water. In fact, fat and water stay pretty separate.

You can see this from a simple experiment. Take a bottle of salad dressing, preferably an Italian dressing, from the refrigerator. You'll observe that the dressing has separated into two phases: the oil, or fat, floats in top of the vinegar. Vinegar is water based. Shake it up. For a brief time the oil and vinegar will mix to become a suspension. In short order, they separate again. If you don't believe vinegar is water based, than repeat the experiment using vegetable oil and water from the tap. Just

be sure to clean up the mess if you slop the suspension out of the container.

Similar separation occurs inside a wrestler's body. The water is found in the blood stream, muscle and other lean organs of the body. When we sweat to stay cool, the fluids we perspire come from the blood. Sweat glands pull water from the blood to make sweat; some electrolytes are lost in the water. The blood stream needs to replace the fluids to maintain its normal consistency and allow the cardiovascular system to operate at full capacity. This can be done by drinking fluids. If that doesn't occur, the blood will pull fluid from inside of the muscle but only to a limited extent. So it's the muscle, not fat, that can provide temporary, though incomplete rehydration. But the muscle becomes dehydrated in the process. And if the fluid loss is severe, the blood really hasn't fully recovered.

Most body fat is deposited around organs and under the skin. The under-the-skin fat is what is measured using skinfold calipers to determine body fatness. This subcutaneous (under-the-skin) fat is highly correlated with total body fat stores. Lesser amounts of body fat are found inside muscle, as a limited energy reserve.

### Burning the Fat

As coaches know, the objective of the minimal weight program is to minimize the degree of dehydration – the loss of body fluids, or water and electrolytes – to make weight. Maximizing fat loss is the goal to keep the wrestlers healthy and performing at their optimal level.

Let's say that the 291-pound heavyweight has at least six pounds of fat that can be lost based on his body fat test. Each pound of fat holds 3,500 Calories. Six pounds of fat store 21,000 Calories of energy. The wrestler needs to burn that up to drop to 285 lb. He can do so by adding to his workouts, cutting back on his food intake or doing a combination of both. Simple, right?

Let's look at what it takes to burn this so we get a perspective of time. In humans,

running a mile expends about 100 Calories. This large of an athlete might burn closer to 150 Calories running a mile. Giving him that benefit, he'd need to run 140 miles without changing his diet to remove the fat. How about wrestling? Our lab recently published a paper<sup>1</sup> in which we estimated that a 2-hour wrestling practice burns 1,000 Calories. That would mean 21 practices.

What if the wrestler diets, even starves by cutting out all calories? A large individual like this might consume 5,000 Calories per day. If he is in energy balance – that is, he isn't losing or gaining weight by eating 5000 Calories – he is then expending 5000 Calories per day. If he starved – cut out all food, all calories – he should lose 6 pounds in 4.2 days. With this approach, it appears he could make weight the week after playoffs.

But what would really happen? After about a day, cutting out all food would cause the wrestler to slack off in his training. He'd also not be eating in any critical nutrients. His body would start breaking down muscle protein. His metabolic rate would naturally and quickly decrease to conserve energy; like putting a Corvette into park, the engine idles to conserve gas. In short order, he would be burning more like 1500 Calories a day and not training very intensely. After that initial day of burning 5000 calories, it would take closer to 11-13 days to make weight. And his fitness would have deteriorated.

To balance weight loss against the demand for training, nutritionists and sports medicine physicians recommend that athletes create a daily calorie mismatch, or deficit, of 500-to-1000 Calories per day. In other words, the athlete needs to burn up 500 to 1000 Calories more than he is consuming. A minimum amount of food is required to sustain the lean body mass and provide energy for activity; this minimum intake will provide substantial calories if the athlete is training intensely and at a high volume (for example, twice a day) as often occurs early in the season. But the volume of training should add the extra calories burned. The adjacent table provides a examples for several weight classes.

Table. Estimates of calorie burning and during to make the weight class.

Wt Class	Current Wt	Minimum Required Intake of Calories	Daily Training Scenarios	Approx. Total Calories Burned	Deficit if minimum is the actually daily intake	Approx. rate of fat weight loss	Time (weeks) to Reach Wt Class
103	110	1500	2-h wrestling practice, 2 mile run, lifting, 30 min of extra drilling	3000	1500	3 lb/wk* (2.7%)	2.5
			1.5-h wrestling practice, lifting	2400	900	2 lb/wk (1.8%)	4
152	165	2700	2-h wrestling practice, 2 mile run, lifting, 30 min of extra drilling	4300	1500	3 lb/wk** (1.8%)	4.5
			1.5-h wrestling practice, lifting	3600	900	2 lb/wk (1.2%)	7
285	291	3500	2-h wrestling practice, 2 mile run, lifting, 30 min of extra drilling	5000	1500	3 lb/wk (1.0%)	2
			1.5-h wrestling practice, lifting	4400	900	2 lb/wk (<1.0%)	3

-Estimate needed to provide daily essential nutrients such as protein, vitamins, and minerals.

\*Will experience muscle loss at this rate.

\*\*Likely to experience muscle loss at this rate.

Doing the math, the 500-to-1000 Calorie per day deficit means a person can lose 1-to-2 pounds per week, pretty much regardless of the person's size (this is based on calories per pound of fat). The state associations are actually being generous by stating this on a % basis. Using the 1.5% rule, the lightest guy on a team gets to lose about 1.5-to-2.0 pounds per week. The 200-pounder gets to lose 4 lb per week.

Most wrestlers are relatively lean and lack excess body fat for weight reduction. The skinfold test confirms this. Finding fat to lose is difficult. Also, considering that an energy deficit of 3500 kilocalories is required to burn up one pound of fat and reduce body weight by one pound a week, the process is slow by all other standards. This approach to weight loss requires strict discipline in a culture where food is extremely tasty, readily available, and the choices are loudly broadcast in t.v. ads, billboards and the like.

In Part 2 of this two-part series, I'll address the approach of using dehydration to make weight.

<sup>1</sup>Horswill, Curby, Bartoli, Stofan and Murray. Effect of carbohydrate intake during wrestling practice on upper-body work in adolescents. *Pediatric Exercise Science* 18: 470-482, 2006.

*Editors note:* Dr. Horswill is currently a Senior Research Fellow at the Gatorade Sports Science Institute. He wrestled for UW-Madison, was a 3-time senior freestyle All-American (USWF), and in 1978, was a member of the US team that competed in the Tblisi Russian National Wrestling

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