Negative Calories

Frozen yogurt is *frozen*, or at least near the ice point, which means that your body has to warm it up. That consumes calories, thus decreasing the net caloric gain of the transaction. Let's work it out:

To melt and warm a mass of frogurt requires energy in the form of heat, to the tune of

$$E = m_f[c_f(T_b - T_{mpf}) + \Delta h_f]$$

where m_f is the mass of frogurt (in grams), c_f is the specific heat of frogurt, T_b is body temperature, T_{mpf} is the melting temperature of frogurt, and Δh_f is the "latent heat of fusion" of frogurt.

For definiteness, assume an ounce of frogurt ($m_f = 28.35$ grams). The specific heat of frogurt is not tabulated, but to a good approximation we can assume it is the same as water ($c_f = 1$ cal/gm-°C). T_b is 37°C, and T_{mpf} is close to 0°C (probably a bit below the freezing point of water, owing to frogurt's well-known antifreeze properties). Finally, Δh_f for water is 79.7 cal/gm. We thus find

$$E = 3308 \text{ cal/oz}$$

Wow! Can that be? Yes, if you remember that a "food calorie" is really a *kilo*calorie. Thus, our final result:

By eating yogurt frozen, you get to deduct 3.3 calories per ounce.

Since frogurt has something like 15 to 25 cal/oz, you're still eating calories (sorry about that), but not as many as advertised, unless the folks who publish the calories have already taken the above into account.

I think the latter is unlikely. After all, Diet Coke (known, variously, as "nature's perfect food" and "the staff of life") represents itself as providing 0 calories per can, whereas a calculation analogous to the above (just leave out the heat-of-fusion term) demonstrates that, when chilled to the ice point, it in fact provides *negative* 12.6 calories per 12-oz can.