

Chapter 7

Calories and Macronutrients

What you need to know is total calorie intake at the end of the day, depending if you're in a deficit or surplus (losing weight or gaining weight), will determine if you stay lean or gain weight. But, that's not to say that calories are the end all, be all, in a nutrition program. In fact, Evans et al. Proved macro-nutrient (protein, carbohydrates, fats) ratios were very important during a calorie deficit (6).

In this chapter we will discuss calories, thermic effect of food, and the importance of macronutrients.

What is a calorie?

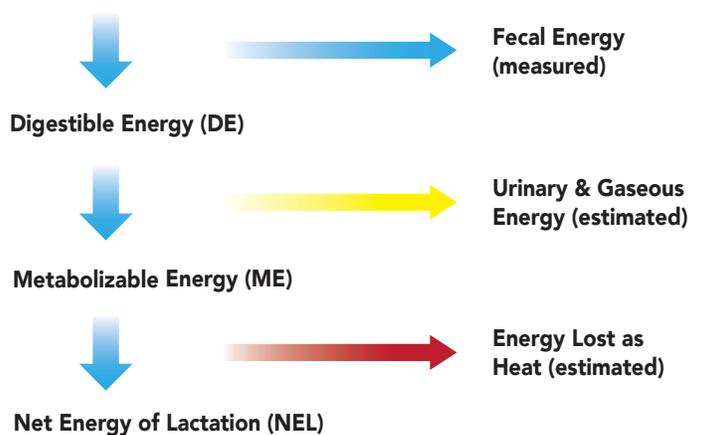
A calorie is the amount of heat required to raise the temperature of 1 kilogram of water by 1 degrees C. The term calorie is synonymous with kilocalorie (abbreviated as kcal). Less commonly, it's referred to as a kilogram-calorie, or large calorie (7). When the term is not capitalized, it technically represents one-thousandth of the value of a kcal. In other words, it's the amount of heat required to raise the temperature of 1 gram of water by 1 degree C. The non-capitalized term is less commonly called a gram-calorie (8).

Calories are Where We Get Our Energy

The calories we take in from food are where we get our energy, therefore we need calories for energy and to stay alive.

We know this may seem odd, but a helpful model for understanding types of energy has been used in cattle production, which relies upon the tracking of energy in order to maintain health, growth, and reproduction (8). It's pretty obvious that humans differ from cows in certain aspects of digestion, but the general framework of food-derived energy use is surprisingly similar. Here's a graphic of the various fates of energy as it flows from the food source through the body of the animal (8).

Gross Energy (Total energy consumed in TMR) (measured)



Starting from the top of the chart above, gross energy is the starting point before ingestion; it's the energy that the food contains. What's left after the fecal energy loss is considered digestible energy. What remains after energy losses through feces, urine, and gas is metabolizable energy. Finally, net energy is what's available for use (storage) after losses through feces, urine, gas and heat increment.

Thermic Effect of Food

Thermic Effect of Food often known as (TEF) is the energy required to digest, transport, and deposit nutrients. Macronutrients vary in their thermic effect, which ultimately influences the net yield of energy available to the body. For instance, Jequier et al. suggested the thermic effect of protein (expressed as a percentage of energy content) is 25-30%, Carbohydrate is 6-8%, and fat is 2-3% (9). Groff et al. Suggested Protein is 20-25%, Fat is 3%, and Carbs 20-30% (3). Moreover, Flat et al. suggested the energy cost of digesting, absorbing, and metabolizing proteins (23%) is greater than that of either carbohydrates (6%) or fat (3%) (10).

As you can see macronutrients vary in thermic effect and they play an important role when trying to make body compositional changes.

Thermic Effect of Food

As you can see, from above in this chapter why it's not wise to solely depend on just counting calories. Macronutrients are important due to what we discussed above regarding the thermic effect of food. If you still aren't buying it, we will reference an elegant study, where they did an isocaloric (meaning same calories) comparison of four diets:

- 1.) *Normal protein, normal carbohydrate*
- 2.) *Normal protein, low carbohydrate*
- 3.) *High protein, normal carbohydrate*
- 4.) *High protein, low carbohydrate*

The two higher protein conditions caused the greatest decreases in body fat (11). Remember the TEF's we talked about earlier?

So clearly macronutrients play a vital role in your nutrition program and should be programmed towards your goals, body type, metabolism, activity, etc.

As we stated in the beginning of this chapter, the amount of total daily calories also known as "Energy Balance" you take in at the end of the day will determine if you gain or lose weight, but it's just one piece of the very large puzzle and you must not count out the importance and role that macronutrients play in body compositional changes.

