

the experiment each subject was given a heavy dose of lampblack in capsules. This blackened the feces to such an extent that it was possible to make a fairly accurate separation of that part derived from the food eaten during the experiment. The lag of the lampblack on the wall of the intestine did, in some instances, make the dividing point somewhat indistinct, but in most cases it was quite clearly marked. The feces thus collected were carefully dried, weighed, and analyzed, and the amount of each constituent excreted calculated. Knowing the weight of each constituent eaten and excreted, and assuming that what is not excreted is digested and absorbed, we calculated the percentage digestibility of each constituent.

Strictly speaking, the results thus obtained do not represent actual or true digestibility, because the feces contain, in addition to the portions of the food not digested, some other materials, such as digestive juices and excretory products. On the other hand, these waste materials, or metabolic products, may be considered as representing the cost of digestion in terms of food ingredients. Consequently, while the figures arrived at may be a little below the true digestibility of the foods, they do represent the amount of food available to the body—for what is lost in the metabolic products must be replaced from the food.

The calculation of the amount of energy available to the body is a little more complicated because all the food digested and retained in the system is not fully oxidized. In computing the total fuel value of the food, we figured on the perfectly correct assumption that all the nutrients, excepting ash, may be completely burned. In the body, however, the protein digested is only partially oxidized, as a portion is excreted in the urine as urea, uric acid, etc., compounds capable of further oxidation. Consequently, in computing the amount of energy available to the body, account must be taken of the fuel value of these incompletely oxidized residual products of protein excreted in the urine. This may be done by collecting all the urine for the experimental feeding period and determining the heat of combustion of the organic matter in it. But, in the absence of any means of marking the urine for a given period, similar to that followed in the case of the feces, the only other alternative is to collect the urine throughout the experimental period and determine its fuel value. This may or may not be equal to that which would be formed by the unoxidized nitrogen compounds from the food under investigation. A much simpler method, and the only one open to us, is to calculate the available energy. It has been found in a large number of experiments conducted in Europe and on this continent that the average heat of combustion of the organic matter of the urine corresponding to one gram of digested protein amounts to 1.25 calories.[†] It is generally believed that the energy of the urine calculated by this factor is reasonably accurate. Consequently, the figures representing the per cent. of available energy

[†]Storrs Experiment Station Report, 1899, p. 100.