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free constituents of the body are also concerned in the production of mechanical force.

In support of the view that the nitrogen-free nutrients are the source of muscular energy, it has been suggested that the protein molecules undergo such change in the animal organism that nitrogen-free substances are produced, and that these are the real source of muscular energy. Voit believed in the theory and advanced the opinion that fat is formed from protein when it is supplied in excess. Many experiments were made which seemed to prove this theory. Among the more important are Petteukofer and Voit's long series of respiration experiments with dogs fed only on meat which was considered to be free from fat. The conclusion was reached that part of the carbon consumed in the protein of the meat remained in the organism in the form of fat, while all the nitrogen was excreted in the urine and feces. Recently Pflüger has carefully recalculated these results and has pointed out that the carbon content of the meat used in the calculation was too high, and the fat content too low. He claims that it is possible to derive all the fat which was stored up in the organism from fat contained in the food.

Voit did not believe that fat would be formed from carbohydrates; but the possibility of this has been repeatedly demonstrated by many experiments since made, among others those of Missel with swine. Pflüger also claims, as a result of his recalculation, that in many cases the result of Voit's and Petteukofer's experiments indicate the formation of fat from carbohydrates.

These opinions to-day are diametrically opposite to those entertained a short time ago. The formation of fat from carbohydrates, which was so long disputed, must be accepted as a well-proven fact; while the proofs of the formation of fat from protein are very much weakened.

But the facts which indicate a cleavage of the protein molecule into molecules containing no nitrogen require further consideration.

In severe cases of diabetes, considerable quantities of sugar are excreted in the urine, even if the diet contains no carbohydrates. It has been shown that the quantity of sugar excreted increases with the increased consumption of protein, but is not affected by the amount of fat consumed. It would seem also that glycogen can be formed and stored up in the liver by fasting animals, from the protein of the organism. This glycogen can be almost eliminated from the body by severe muscular exertion, thus indicating that carbohydrates can yield muscular energy.

The question of the most suitable proportions in which to combine the nutrients in order that the greatest amount of muscular labor will be produced is an important one. We will first consider the amount available under ordinary circumstances, as determined by experiments. It has been determined that about 35 per cent. of the total energy of the food is available for external muscular labor in the case of horses and dogs. Comparison shows that the animal organism utilizes the energy of the food for the production of external muscular work much more thoroughly than an engine utilizes the energy of fuel when only about 5 per cent. of the energy represented by the fuel value of the coal is transformed into mechanical power. The kind of food fed greatly influences the amount of energy available for external work. The nutrients which are assimilated from coarse fodder yield the organism about 20 per cent. less available energy than the same amount assimilated from grain, since the coarse fodder requires so much more energy for its digestion.

According to experiments, intense muscular energy must be derived from the combustion of protein. A greater amount of work performed in a much more leisurely way may be provided for by the combustion of nitrogen-free nutrients. This, perhaps, explains why many of the poorer classes in Europe and Asia exist in comparative comfort on a diet which, according to American ideas, is deficient in protein. The character and not the amount of work determines the amount of protein necessary. This theory certainly harmonizes with observed facts better than any other.—Synopsis of Prof. Zuntz's conclusions from Experiment Station Record.

To Meet Low Prices.

A farmer in Illinois writes to the Country Gentleman as follows about the present condition of things on the farms of those farmers who are able to save some money even at the present low prices of farm products.

Lower prices and closer margins of profit have reduced but not eliminated the reckless waste of the past. The forage and straw of 150 million acres of cereals are not so nearly thrown away. The silo is preserving in succulence, immense masses of green forage; the shredder is rendering more available, eighty million acres of maize fodder; straw is beginning to be utilized in connection with various oleaginous and nitrogenous feeds, better balanced ratios avoid useless waste of feeding material; some farmers are beginning to learn the wastefulness of feed as fuel, and so protect their live stock from the wintry blasts, and keep their cattle growing in winter as well as summer, increasing the quantity and improving the quality of their beef.

More regular and scientific breeding is bringing meat-producing animals to the block in little more than half the time formerly required. There is greater economy of labor in every line of farm work, means are better adapted to ends, and much wasted effort avoided, yet there is still large room for improvement.

In these and many other directions there has been economic progress, which low prices have quickened, so that the cost of crops is greatly reduced, as has been the cost of almost every product of manufacture throughout the world.