

ceed simultaneously, the best and most economical food will be, first, that which contains its constituents in the most readily assimilable form; and, secondly, that which contains them mixed together in the most suitable proportions.

The importance of a proper balance between the relative quantities of the two great classes of nutritive constituents must also be sufficiently obvious. If, for instance, an animal be supplied with food containing a large quantity of nitrogenous and a deficiency of heat-producing compounds, the result must be, either that it languishes for want of the latter, or it is forced to supply the defect by the increased consumption of food; in doing which it must take into its system a much larger amount of nitrogenous matters than are requisite for supplying the waste of the tissues; and thus there is an unnecessary and wasteful expenditure of these substances.

The proper adjustment of the relative proportions of nitrogenous and non-nitrogenous food is the foundation of successful feeding, and its importance has of late years been fully recognised by chemists.

*Importance of Warmth, Cleanliness, and Ventilation.*—The other great source of loss of food is the maintenance of the animal heat, which is a matter in this extreme climate of the highest consideration. It has been well observed that an animal may, in certain respects, be compared to a furnace, in which a quantity of fuel is burned to produce the animal heat. It may, in fact, be stated as a general rule, that the warmer cattle can be kept the more rapidly will they fatten, all other circumstances being alike. The cleanliness and proper ventilation of the houses should be attended to, and the state of the dung observed, care being taken that the excretions are regular, and every tendency to scouring, or the reverse, immediately corrected.

*Importance of Bulk in Food.*—Although the presence of a sufficient quantity of nutritive matter in the food is naturally the most fundamental matter for consideration, its bulk is scarcely less important. The function of digestion requires that the food shall properly fill the stomach; and however large the supply of nutritive matters may be, their effect is imperfectly brought out if

the food be too small in bulk; and it actually becomes more valuable if diluted with woody fibre, or some other inert substance. On the other hand, if a food be too bulky, the sense of repletion causes the animal to cease eating long before it has obtained a sufficient supply of nutritive matter. It is most necessary, therefore, to study the bulk of the food, and to consider how to mix different substances in such a manner as to adjust the proportions of nutritive matter to their bulk.

*Farm Crops; how best and most economically used as Food.*—These crops are hay, straw, turnips, mangold, peas, potatoes, &c., and they include those most remarkable for their bulky nature; the turnip, for instance, containing less than 8 per cent. of nutritive matters. All of them are also remarkably deficient in fatty matters; the bean, which is much richer than any of the others, rarely containing so much as 5 per cent. The result of all feeding experiments leads to the conclusion, that animals cannot be brought to the highest degree of fatness upon turnips, or even on hay, alone.

A peculiarly interesting series of experiments by Wolff have shown that sheep, which, when fed on hay of average quality, attain a weight of about 90 lb., will gain an additional 10 lb., if rape cake, or some other food containing a large quantity of nutriment, be given them. As a general rule, such substances as oil-cake, rape-cake, corn meal, &c., greatly promote the fattening process, and they operate partly by supplying a larger quantity of nutritive matters within the bulk which the stomach requires, and partly by increasing the supply of nitrogenous matters, in which they are particularly rich.

*Proportions of Flesh and Heat-producing Elements in Food.*—All, however, depends upon the ratio of flesh and heat-producing elements being the right one; and it would appear that this proportion differs according to the object of the feeding. Wolff, who has directed much attention to this subject, states, as the result of his experiments, that for maintaining animals at a moderate weight they should be as 1 to 8, for young cattle as 1 to 7, and for fattening as 1 to 5 or 6. He found by actual experiment that the production of milk was largest when the