

tained by chemical analysis, the amount of its several constituents digested was ascertained also by comparing the composition of the fodder actually eaten with the composition of the solid excrements and by a few others in which only the effect of a ration of known composition on the animal was noted. Wolf has given us as the approximate required composition of the maintenance ration for a full grown beef animal:—75 lbs. of digestible albuminoids, 825 lbs. of digestible non-nitrogenous matter, and a nutritive ration in which the digestible fat is reckoned as equal to  $2\frac{1}{2}$  times its weight of starch of 1 part of digestible albuminoids to 11 or 12 of digestible non-nitrogenous matters, and with a total of 14-15 lbs. of dry substance in the ration; this is the acquirement per day for each, 1,000 lbs live. weight. Prof. Sanborn in feeding experiments at the New Hampshire Agricultural College has found that steers have gained for 49 days continuously on half as much albuminoids and three-fourths as much non-nitrogenous matter; and on what was very nearly equal to the maintenance ration given above, he has got 1.37 lbs. of increase in live weight per day; or steers have grown well on a ration in which the nutritive ration was 1.12, and in another instance have gained 6-7 lbs. daily on a nutritive ration of 1.21. He thought that results so widely at variance with the German estimates startled specialists, for if they were accepted, the whole system of calculated rations based on those estimates must fall, and a new one be made, at least so far as the United States were concerned. The importance of the subject demands much experimentation in the same direction. He made experiments. Three steers, one nearly three years old, and the other two nearly two years old, were put on a ration calculated from the tables of the average composition of articles of fodder given in "Armsby's Manual of cattle Feeding," when we find the composition of such American grown fodders as have been carefully analyzed, and from Wolf's table of digestibility of fodder, the ration thus calculated as nearly as could be then estimated, the German maintenance ration, and consisted for 2,000 lbs. live weight, per day, of corn stalks, 14 2 lbs; clover hay, 3 8 lbs; cornmeal, 1 9 lbs; off malt sprouts, 84 lb. The whole ration for the three animals was weighed out together, the corn stalks being cut up, moistened and sprinkled with the meal and malt sprouts, and then divided, approximatively, in proportion to their relative weight, between the three animals. It was eaten up all but quite clean. The animals were weighed every morning after eating and before drinking. They were continued on this ration for six weeks beginning March 13th.

The average of the weighings of each successive week shows a steady though slight gain from week to week in the case of all the animals, and the average aggregate weight of the three was, for the first week, 2,535 lbs.; for the second, 2,571; for the third, 2,590; for the fourth, 2,633; for the fifth, 2,635, and for the sixth, 2,773—or per day on 1,000 lbs. live weight, 2 35 lbs. if we compare the first and last averages. Before the end of the feeding experiment, the fodder used was analyzed, and on calculation of the composition of the ration used on the basis of its actual composition, instead of the basis of average composition, it was found that, owing to the good quality of the corn stalks, which made up so large a part of the ration, the animals had been given daily 8 lbs. of digestible albuminoids instead of 7.5; and 8.03 of digestible non nitrogenous matters, instead of 8.25; and 17 6 lbs. of total dry substances, instead of 11.5; the nutritive ration was 1.10 instead of 1.12. The paper continued giving further particulars about other experiments equally successful.

## AGRICULTURAL LETTER.

PARIS, OCTOBER 7.

Mr Joulic, head chemist in one of the principal hospitals of this city, has been studying for several years the cultivation of wheat, with the view of diminishing its cost of production. He studies the plant in its various stages of vegetation, and studies the means best calculated to prevent the crop from being laid, and to ensure the ears to be well-filled with plump grain. The influence of the composition of the soil has been examined, not only when it is defective in certain elements, but when these elements even are present in excess. Farmyard manure, Mr Joulic considers to be a capricious fertilizer, in regard to its richness in nitrogen; wheat he says ought not to be cultivated on a soil directly treated with farm yard manure; (1) a root crop should intervene; to supply nitrogen to wheat culture, the assimilable nitrates or ammoniacal salts ought to be resorted to, the former for argillaceous and calcareous soils, the latter for light ones; superphosphate of lime is to be depended upon as a sheet anchor in wheat culture, and potash in case it be deficient. Expend at least 22 sous per 22 gallons of wheat raised, on mineral manures, and count upon the atmosphere somewhat for nitrogen, concludes Mr Joulic. His views have made a little noise, but they require to be steadied. It is an illusion to expect that a *pro rata* expenditure of 22 sous will equalize the mineral elements in the soil, for not only do these elements vary in point of utility following the nature of soils, but their commercial value is fluctuation itself. Farmers must not be led away by the siren theory, that to employ mineral manures will keep up the fertility of their land; let them purchase guanos, cake, farmyard manure, ammoniacal salts, while they will be able to obtain them. There is nothing to be disputed as to wheat succeeding a tillage crop, but it is absolutely gratuitous to lay down that the atmosphere supplies the nitrogen.

Professor Dehérain, of Grignon, finds after six years experiments on ordinary cultivated crops, that farm yard manure was superior to all others in respect to greater produce, and less exhaustion of the soil. The culture of sainfoin during three consecutive years led to an augmentation of nitrogenous matter in the arable soil, but this accumulation was not due to the plant absorbing nitrogen from the air, but to the exclusion of carbonic acid, which in the case of tillage, burns and destroys the organic substances in the surface soil. The same gentleman found in the case of oats, that the nature of the manure, but above all the season, can affect the richness of the grain in azote, to the extent of a double percentage.

Mr Dubsot has investigated the fluctuations in the price, production, and consumption of grain, during the last 60 years in France. Despite the increase of production and importations, one-fourth of the population of France, or 9 millions of people, have to depend on other cereals than wheat, for their daily bread. Thus France has a sufficient home market for her wheat. Relative to prices; these have not remained stationary, as is commonly supposed, but have augmented periodically, also, the elevation of price has been uniform, while remaining progressive, and in, addition, the entire country has benefited accordingly.

The population of France is 36 millions. each individual represents an annual consumption of grain, of 154 gallons, the produce in round figures of one acre of land; one-half, of the total of cereals raised is wheat, one-quarter, oats; the remainder, rye, barley, buckwheat and maize. The yield of grain varies in France, a  $\frac{1}{3}$ th above, or the same below the

(1) Wherefore, in Kent, Eng., we dung the young seeds.