of 65 lbs. of juice, containing, according to the mean result of the analyses, 5¼ lbs. of sugar. The real loss of sugar, therefore, sustained, when we obtain only 4¼ lbs. of it from 100 lbs. of beet root, may be stated as about one fifth. This loss, great as it appears, is often estimated to be still greater when the roots contain from 10 to 11 per cent. of crystallizable sugar. In sugar-cane works, the saccharine matter left in the begasse or pressed canes, is completely lost, being either burnt with the wood or destroyed by fermentation. In this respect the beet root has an advantage over the sugar-cane, which is, that the sugar of the pressed pulpy matter may serve as food for cattle. This pulp cake, indeed, is ungrated beet; and if as cattle-food a little inferior to the entire root, it arises only from containing a large proportion of woody matter which belonged to the juice extracted by the press. We may even estimate approximatively the composition of the pulp relatively to that of the rest; for, according to the average constitution we have already assigned to the beet root, and supposing that it has yielded 65 per cent. of juice, and 35 per cent. of pulp, it is obvious that 100 parts by weight of pulp will give 79 of water, 7 of sugar and albumen, and 14 of woody matter. One of the causes which have, perhaps, the greatest influence in diminishing the amount of saccharine yielded by the beet, is the difficulty of preserving its root when it has attained its maturity. The crop being taken up at the end of autumn, the bulbs are as liable to injury from the severity of winter as from too mild an atmosphere. The frost destroys their organization, while mild winters promote their vegetative tendency at the expense of the sugar they contain. As beet contains saccharine matter at every stage of its growth, it might, perhaps, be advisable to prevent its attaining its full development by taking it up earlier. By sowing also more thickly, and commencing the extraction of the sugar before the full time of the crop, we should probably be enabled to compensate the difference that would result, as one of the consequences of this innovation, from the less size and weight of the bulbs. Should this view of M. Peligot be realized, even to a certain extent only, in practice, the cultivation of the beet would recur more nearly to that of the sugar-cane, in allowing to the manufacture of beet sugar a routine that would be found to diminish the inconveniences attending the preservation of the root.

Pabst (1851).—Beet roots are, from autumn to spring, a wholesome food, promoting at the same time both the milk and the flesh of an animal. They are more watery than potatoes, and on the average 3lbs. beet root may be reckoned for 2lbs potatoes; but as they are neither purgative nor flatulent, when obtained in good condition and given with the necessary addition of dry fodder, beet roots in a raw state may be given in a considerably greater quantity than potatoes can. When the beet is of really good quality, as for instance of the yellow globe Obendorf, or the white Silesian, sugar beet varieties, 275 lbs. will be found equal to 200 lbs. of potatoes, or 100 lbs. of good sound hay. I found, during the course of some experiments on fodder made by me at Hohenheim, in 1825, that a fodder composed of one-fourth potatoes, one-fourth beet root, and one-half hay and straw, was quite as valuable for dairy stock as 250 lbs. of beet and 200 of potatoes. There is, indeed, no reason whatever for giving beet root to cattle in any other than its raw state, as its value for fodder would not be increased by boiling or steaming. When good stacks of beet are made, and a portion also is put away in the store-house, it will keep fit for use until May, provided it be guarded from the injury of frost on the one hand, and from the influence of too warm an atmosphere on the other, for this root loses much of its value as soon as it begins to sprout. In every case the sugar beets are more easily wintered than the other varieties; and their value on that account is essentially increased.

Wolff (1851).—Sugar occurs in the vegetable kingdom of two essentially different kinds—namely, as raw sugar, and as grape or fruit sugar. The first kind is well known as being present in the sugar-cane, as well as predominating in the juice of the beet root and of the maple tree; it differs from the second kind in external condition by the perfect facility with which it crystallizes, and chemically, by the less proportion of water it contains. Raw sugar contains rather less oxygen and hydrogen (in the proportions forming water) than the starch or dextrine (starch-gum), out of which sugar is in every case formed; while grape sugar, on the other hand, contains rather a greater amount of those two elements of water. Raw sugar is easily converted into grape sugar during the process of fermentation, by the action of the peculiar substance diastase, and by means of diluted acid; so that it is probable that, on the abstraction of water in the vegetable organism, raw sugar first arises out of dextrine, and is again, on the resumption of a certain portion of water, further changed into grape sugar—namely, into a kind of sugar which occurs far more frequently in the vegetable world than raw sugar does. Sugar is formed in large quantities in different plants and particular portions of them at certain seasons of the year; in fruits at their time of ripening, in many roots at the end of summer, in trees in the spring, in all young plants during the first period of their growth. We cannot regard any particular organ, not even in the case of one and the same plant, as the seat of sugar-formation: for even saccharine matter, like all matter universally diffused in the vegetable kingdom, is produced in the most widely different portions of plants; the formation of dextrine, however, always precedes that of sugar. It has been observed, for instance, that in spring the juice of the birch-tree is richer in sugar, in proportion as the part from which it is