sian beet. As a successful exhibitor of large roots at various shows, he fully concurred with Dr. Voelcker as to the uselessness of these big roots; what they required was a good crop of medium-sized roots, and not those "sensational" roots that were the admiration of women and children.

Mr Coussmaker said that the discussion that evening abundantly proved that the discussion of subjects of practical importance to the farmer was as popular as ever to the members of that Club. It was many years since he had been on his feet in that room, but as a large grower of roots the subject had tempted him to rise. Speaking of the value of roots as food, he would mention that he had made a practice of giving mangels kept late on in summer, along with tares, even dispensing with the use of oil-cake. He spoke of Sutton's Golden Tankard as the best mangel he knew.

Mr. Caldecott said mangels were more valuable for feeding purposes than swedes.—He had found that manure manufactured from sewage was hardly worth the cartage. Also that the injudicious application of manure to the land favoured the growth of weeds. Sewage, however, when judiciously applied to young roots, would be found of great advantage.

Mr. Little said that his experience thoroughly agreed with that of Dr. Voelcker, that the excessive use of farmyard manure was rather detrimental than otherwise. He also agreed with him in condemning the folly of growing large roots. Mr. Lawes, in last year's *Agricultural Gazette*, had said that in comparing two crops grown in Ireland, he had found that a crop of mangels, of 40 ton to the acre, did not exceed in feeding power another where only 20 ton per acre were obtained.—Still he would not condemn large roots entirely, but would remind them that they were glad with anything to fill the bellies of their animals.

Mr. J. J. Mechi said he had always been a large grower of mangels, of which he never failed to get a good crop. He had grown as many as 43 ton per acre. Neither kohl rabi nor cabbage had been mentioned, and yet they were both very valuable and important crops.

Mr. Trethewy considered kohl rabi one of our most valuable crops, and he was surprised that Dr. Voelcker had omitted all mention of it from his paper. The keeping power of mangels depended to a great extent upon the mode of stacking. The longer mangels were kept in season the better. He was now feeding his cattle with last year's mangels. Kohl rabi had this great advantage over all other roots—it could be had, by being sown at the proper time, from September to March, and produced more per acre than any other.

Mr. C. S. Read, M. P., said as he had spent some time this summer and autumn in wandering over England, Scotland, and the Continent, he had had some opportunity of observing that which Dr. Voelcker treated last and least—climate. He expressed his wonder at seeing that Norfolk was doing so ill in that which Scotland was doing so well in—the growth of mangel. The wretched crops obtained in Norfolk must be owing to the soil being sick of the mangel, or else the manures were too stimulating, for while gentlemen were talking of raising 40 ton per acre, the average in Norfolk was not more than 10 ton. He had tried kohl rabi, but had given up that. As to the time of using mangel, some had said it should not be used until July, but he would use the current crop in October, if it had been pulled up for two or three weeks before use. As to the large crops, a year ago he had made a remark expressing doubts as to large crops, (of 46 ton to the acre), and to those who agreed with him in his doubts he said that if they went into the South of England and into Scotland they would be astonished at the growth of root crops. He could say, too, that it was astonishing that the diseases of swedes did not seem to extend to Scotland, for he saw more bad swedes on his farm than he had seen in the whole of Scotland. He considered that in the East the growth of mangel must be persevered with. With regard to large roots he could only say that at the present time a large quantity of dry provender was used, and so the fact of their containing a quantity of water did not so much matter.

Dr. Voelcker, referring to the relation of climate to the subject, said that until last year he had always been rather doubtful about the large root crops grown in Scotland, but after having seen some last year he was no longer surprised. He asked what manure they put per acre in order to produce these crops. He was told 10 cwt. of bone dust, 5 cwt. Peruvian guano, and 5 cwt. superphosphate. They might judge from that of the cost of these crops.

After votes of thanks to Dr. Voelcker and the Chairman, the meeting adjourned.—*Agricultural Gazette.*

ROTATION OF CROPS.

(Concluded.)

We shall proceed to discuss the various kinds of Rotations that have been or are still in use among farmers; and on this part of our subject we may, even at this period, accept the authority of Sir John Sinclair, as one of the most satisfactory of any brought to the discussion of the topic; we shall, therefore, draw largely from the facts and opinions which he details.

The first kind of rotation, we shall notice, is that called the "Two Years' Rotation"—It is only in particular cases that farmers have adopted a rotation of two crops. This was, however, illustrated by a field belonging to the Honourable George Abercromby, embanked from the Forth, which carried, for several successive years, beans and wheat alternately. Upon his best loams Mr. Brown of Markle also obtained wheat and beans alternately, summer fallowing the ground when its condition required that process. Mr. Fairie of Farme, near Glasgow, adopted the same system, giving a moderate dressing of dung every four years. A similar system has been tried near Edinburgh, on loam, the rotation being wheat and green crops alternately, potatoes and beans, both drilled. In the course of fourteen years, a field of 4½ acres gave four crops of potatoes, three of beans and seven of wheat. To every green crop, putrescent manure was applied; thirty tons at least to potatoes, and twenty-five to beans. The potato-crops were all good. The two first crops of beans were very good—the third indifferent; but the crops of wheat were large, producing from ten to thirteen bolls, perScotch acre, or from 32 to 21 bushels per English acre. The only deficiency was in a crop which averaged but 9 bolls per acre; but that might have been caused by a season peculiarly unfavourable. There was no evidence of diminished fertility in the field, and it was perfectly free from couch grass and rooted perennial weeds. In fact, Dr. Stuart stated, that the quantity of produce had not diminished from the above rotation, but that both the wheat and beans degenerated in quality; and on this account, though the result might not be thought unfavourable by many, he would not, adopt it, if he had a larger space of land on his farm calculated for wheat. It is evident that it is only on the richest loams, or most fertile soils, or where manure is plentiful, that such a rotation is practicable.

Three Years' Rotation—Sir John Sinclair observes in reference to this rotation of three crops, that as there was no instance of that sort in Scotland, he could give an example practiced by a native of Scotland, Mr. Arbuthnot, who farmed at Surrey: that gentleman practiced, for nine years, a three-course system, viz., 1 beans; 2, wheat; 3, clover; and when he quitted the farm where that plan was adopted he was fully persuaded, that he could have continued the same rotation for many years longer. This, however, was effected by means of London dung, which he had at command, and which he gave to the bean crop. He also ploughed nine inches deep, with a swing plough, the construction of which has been justly celebrated.

Other farmers have followed a similar system; for instance, 1, potatoes, cabbage, or hoed crops, with manure; 2, wheat, and 3, clover or grass; or 1, hoed crop, with manure; 2, half oats and half barley; 3, clover or grass.

Dr. Coventry has made some observations upon these courses to which he urges the following objections; 1. That there is rather too large a proportion of fallow or cleansing crop, more than what can be wanted in ordinary situations to preserve the land free of weeds. 2. By there being but one third bearing corn, it is less profitable than it might be. 3. There are two species of crops in the first example, which circumstance does not permit the labour to be sufficiently divided and extended over the year, and leaves too much to be risked on the success of a particular crop. 4. The quantity of straw obtained for food or litter, to live stock, must be rather scanty, or in a deficient proportion to what will in general be wanted.

The advantages of such a system, he states in the following terms:—1. From the great proportion of green crops in this course, much manure will be procured, for all the straw will be converted into dung. 2. This scheme is calculated to render or preserve the land very clean of weeds, in consequence of which Sir John Sinclair thought it might answer as a beginning course in situations where the ground was foul and manure wanted; not indeed that it was in general use in any district, for it had only been followed by some individuals, who found it of benefit in the respects above-mentioned.

Four Years' Rotations.—Rotations of *four crops* have long been more general, and their merits, as compared with the present improved rotations, were fully discussed in previous numbers. The first to be pointed out here is the celebrated Norfolk system, namely, 1, turnips; 2, barley; 3, clover, and 4 wheat, which was long extensively adopted in several parts of Scotland. Even in Norfolk, however, his