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ON THE MAINTENANCE OF FER-
TILITY IN NEW ARABLE
LAND.

The question for consideration is:—How can any given degree of fertility in land be maintained? Professor Johnston has conclusively answered it, when he says—'Soil which are chemically and physically alike are agriculturally equal.' Given, a soil whose net annual produce shall be a certain acreable sum, and you preserve its agricultural identity—its capability of annually raising similar crops, simply by taking care that its composition and its texture shall remain unaltered. This is what theory says upon the subject, and one does not see what objection can be made to a statement whose truth is so nearly self-evident. Agriculture is just to be considered as a manufacture, by which certain substances contained in the soil are converted into vegetable and animal produce; and its results, or, to use other terms, the fertility of land, must therefore depend on the occurrence of those substances in abundance, and in due relative proportion. Let them be present *thus*, and let the great mass of the soil—the mixed clay and sand and lime in it—be of such extreme as permits a sufficiently free passage through it both to air and water, and the soil will be at its highest pitch of fertility. Let either its texture or its composition fail of this standard, and its productiveness will diminish. And there is no need for imagining any mystery in this matter, as one is apt to do in cases, as in Agriculture, where the unknown principle of life is concerned—this failure in the productiveness of a soil doubtless occurs just in the same way as does that of a tile-mill or a cotton factory, to which the raw material has been supplied in diminished quantity or of inferior quality. The fertility of the soil will be perfectly restored by replacing its texture and composition in their original condition. These are two essential elements of its agricultural character. The latter is of the same obvious and immediate importance to vegetable growth that the furnishing of its food store is to an animal; for on the composition of the soil depends the supply of nutriment to the plant. The former exerts an influence in several ways. On the texture of a soil depends its suitability for the growth of different crops; light soils being adapted to one class of plants and heavy soils to another. It is on this also

there will for the most part depend *rapidity* of vegetable growth; for to it is due the *fecundity* with which rain-water, falling on the surface of the land, dissolves its soluble portions out, and carries them to the roots of the plants. And, lastly, it is to the texture of the soil that that free access of air and of rain-water to every part of it is due, to the chemical processes connected with which so much of agricultural fertility must be referred. And it is this aspect of the matter which connects it with the subject of the present paper. Dr. Daubeny pointed out, in the last number of the Journal, that independently of the small quantity of vegetable food, so to speak, available for use at any one time, an immense store resides in most soils in a dormant condition, capable of gradual development as it may be required; and this process of development may by various artificial means, as by fallowing, the cultivation of fallow crops, the application of lime, &c., be greatly accelerated. It thus appears that there is hope for almost any soil; that in few cases can land be so 'run out,' as to require the direct supply of *all* the substances which are needed to create fertility; for many of them are already present, and it only requires a little skilful management to exhibit them. It is on the same ground that we must explain the practice, often to be seen, of allowing worn-out land to 'rest' for a while after a long period of mismanagement has exhausted its fertility. The success of this expedient, however, does not justify the practice, which is obviously most wasteful both of time and of means. The amount of 'active' fertility in the soil ought by a judicious system of cropping and of consumption on the farm, to be made nearly to reproduce itself year by year; and the gradual development of that which lies 'dormant,' instead of acting as a sinking-fund to wipe out the evils of past mismanagement, would then go annually to increase the fertility of the land. It is the liability of arable land to the mismanagement I speak of which has hindered the conversion of thousands of acres of grass-land, at a time when the large acreable produce of good arable culture is so much wanted. May we not hope that the greater capability of improvement, which is also characteristic of cultivated land, will, as agricultural intelligence extends, be as efficient for the future in inducing owners of pasture lands rapidly to bring them under the plough.

The following particulars regarding the cultivation of Whitfield farm, and its results, fully bear out the views which I have quoted from Professor Johnston and Dr. Daubeny.

The principal feature in the system, and of course I do not describe it as anything new, is the alteration of grain crops for sale with green crops for consumption.

After the drainage of the land, half of it was ploughed up before winter, and half pared and burnt early in spring; the former portion was sown, most of it, with oats; the latter was prepared for turnips. The elements of fertility naturally present in the soil insured the abundance of the first crops, and thus sufficed, free of expense, to start that system of Husbandry in full vigour, which more than any other that can be named has the merit of self-maintenance. Every other year, for a longer or shorter period since, every field on the farm has borne a crop of wheat, and on the alternate years the crops have been successively clover, turnips, carrots, clover, mangold wurtzel, and potatoes. The root crops have been for the most part carried to the buildings, and there consumed with and on the straw, by cattle, sheep, and pigs. The dung thus manufactured is either carried out, as it is made, to the fields on which during the ensuing year it will be used, or to stations near the liquid manure tanks, where it may be properly manufactured. About three thousand cubic yards are thus annually applied to the green crops. It is not only made from the consumption of roots and straw, but large quantities of oil-cake, oats, linseed, and beans are also consumed, and these no doubt add much to the richness. The annual application of so much fertilising matter insure, heavy crops of roots and straw—to insure that on which the Farmer depends for the re-application each year of an equal quantity of manure. The system thus maintains itself; it was set agoing without much expense, and it contains within it the elements of a permanent establishment.

No doubt in this, as in every other system of cultivation I have heard of, the soil suffers an annual abstraction of its substance; but this is not necessarily inconsistent with the maintenance of fertility. Dr. Daubeny has shewn us the soil contains, so to speak, an exhausted store of fertilising matter; and all that needed to make this abundance apparent as well as real, is so to expose