

cal data to be perceived. But years after the utter worthlessness of this method of treating sewage had been laboriously demonstrated *adnauseam*, ignorant and plausible adventurers succeeded in persuading the authorities of provincial towns to renew the attempt under some novel disguise, and for a time outweighed the sound and trustworthy opinions and advice of men competent to pronounce a judgment on the subject.

The notion now most in favor is to distribute the sewage of London in small quantities over an enormous area, applying it to all kinds of crops; but, if there be any evidence as to the utility of sewage as manure, it is that it depends upon the copious application of it on a comparatively small area, in regard to the actual amount of manure substance it contains. This is the course indicated, not only by practice but also by considerations as to the cost of distribution, and various other important particulars. Hence, it is not surprising to find it stated, as the result of investigation, than an attempt to apply the sewage of London, in its present state of dilution, to crops generally, in quantities of a few hundred tons per acre annually, would result in great pecuniary loss and signal failure, and that it is clearly quite fallacious to assume the general applicability to all crops, of manure so diluted, on the ground of any considerations as to the value and applicability of the same constituents in the undiluted state. The practical manure value of sewage cannot with any justice or reason be calculated according to the amount of manure substances it contains, since it is not known how far they can become available when the sewage has been applied to land.

Over and above all these uncertainties there is the engineering question as to the cost of putting it on the land, of which, perhaps, nothing more than a mere approximate guess has been made.

It would be a strange result if it should be found that the water-carriage system of disposing of town refuse, which has of late years been a source of so much satisfaction to sanitary reformers, has been altogether a mistake, and a retrogression instead of an improvement. Such a result is not without its probabilities, when considered from more than one point of view, nor is it at all improbable that means might be devised for inoffensively disposing of the excreta of a large population without the aid of water-carriage, and that by retaining them in a comparatively portable form they might be rendered available in augmenting and maintaining the fertility of the land in the place of the materials now imported at such considerable cost for the purposes of agriculture. Whether such a change is ever likely to be effected is, however, far beyond the range even of conjecture.

In a review of a little work by Mr. Lawes on this subject, the *Chemical News* has the following statistics:—

The Royal Commissioners appointed some years ago "to inquire into the best mode of distributing the sewage of towns, and applying it to beneficial and profitable uses," commenced their inquiry by visiting almost every locality in this country and on the Continent where sewage was applied in any way for the purposes of agriculture, and the evidence they collected on the subject was in every

respect very conflicting. Though relating to the practical application of sewage as manure, it consisted almost entirely of mere opinions more or less favorable and unfavorable, and therefore the Commissioners, feeling the importance of the question they were called upon to investigate, and the necessity of obtaining more exact and trustworthy data on which to base their opinion in regard to a subject of such vast sanitary and economic interest, determined upon instituting a series of experiments. These experiments were made on a farm at Rugby, which had previously been manured with sewage, and the above named pamphlet contains an account of the mode in which they were conducted, and the results arrived at.

The quantity of sewage applied per acre varied from 3,000 to 9,000 tons per acre per annum, and the quantities of grass obtained per acre were from 14 to 33 tons per acre, as compared with about 9 tons per acre obtained from the land without sewage, the increase in the quantity of green grass per acre being from 3 to 5 tons, according to the quality of sewage applied and the situation of the land. As an average of all the results, this increase was equal to about three-fourths of a ton of hay per acre for each 1,000 tons of sewage supplied.

The grass thus obtained was consumed in feeding oxen and milch cows in sheds. Neither the oxen nor cows were found to do well on the grass alone, without a mixture of oil-cake, which was supplied to both during the latter part of the experiments. In the case of oxen, the produce of grass per acre proved to be capable of feeding one ox from 45 to 99 weeks, according to the quantity of sewage applied to the land, and as compared with the produce of unsewaged land, which yielded grass sufficient to keep an ox only 33 weeks; but in the latter case the grass was of better quality than the grass from the sewaged land. The increase in live weight of cattle fed varied from 134 lbs. to 297 lbs. per acre, as compared with 88 lbs. in the case of unsewaged land. Taking the average of the oxen, those fed on unsewaged grass gave scarcely $2\frac{1}{2}$ lbs. increase per week on 1,000 lbs. live weight, and those fed on sewage grass scarcely $2\frac{1}{2}$ lbs. increase; whereas, with good fattening food, such oxen should give an increase per week of from 9 to 10 lbs. per 1,000 lbs. of live weight. The result of this application of the large quantity of grass obtainable by the use of sewage was therefore far from favorable.

In the case of cows more favorable results were obtained. The average yield of milk per head was less in the case of sewaged grass than in the case of unsewaged grass, being in the one case 20 lbs. and in the other nearly 25 lbs. daily; but the consumption of unsewaged grass per head was greater than the consumption of sewaged grass, in the proportion of 150 lbs. to 124 lbs. The produce of the unsewaged land would keep one cow 19 weeks per acre, while the produce of the sewaged land kept one cow from 41 to 69 weeks per acre, according to the quantity of sewage applied. The total yield of milk per acre was 321 gallons in the case of unsewaged land, and from 570 to 961 gallons for the sewaged land; the quantity of milk obtainable being dependent very much on the quantity of sewage applied; the increase in the quantity of milk per 1,000 tons sewage used varying from 5% to 6% in value per acre.