

any—was very trifling. Since the use of bones has, however, become general, the turnip crop has been, in many instances, ten-fold, and in few less than four or five-fold its former bulk. All the succeeding crops of grain and seeds have been amazingly increased, and, upon the four or five-shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."

On *light loams*, the returns to the Doncaster Committee give bones a preference to farm-yard dung. And we learn that, upon the calcareous soil of the Yorkshire Wolds, heavy crops of turnips have been raised from 16 bushels per acre of bones, while in the same field, and under similar circumstances, but manured from the farm-yard at the rate of from 8 to 10 tons per acre, the turnips have been of the most inferior description.

On *peat soils*, if previously drained and laid dry, their advantages are reported to be so striking, that from fifteen to twenty bushels of dust per acre, drilled, have been also found to very far surpass the ordinary dressing of stable-dung, and even of lime and pigeons'-dung.

On *gravels*, the reports are meagre and contradictory, though perhaps reconcilable in principle, as it has been justly observed, that "a gravelly soil may embrace every variety of texture and quality, from the light dry sand to the water-logged yellow clay—preserving in each the necessary admixture of stones and grit." To wet gravel, their application has been found decidedly unfavourable*.

ANALYSIS.

An examination of the component parts of soils, and of the power of bones, when applied to them as manure, would go far to explain the irregularity of their different effects upon various kinds of soil. Bone is known to consist of about equal parts of earthy and animal matter; the former chiefly composed of gypsum—which is of so indestructible a nature as to have been termed, by early chemists, the "earth of bones"—and a small portion of carbonate of lime; from which we may conclude that probably half the weight of bones is in the greater part consumed by plants as direct nourishment in their state of growth, and that the remainder is more gradually absorbed by the soil, as well also as by the plants; for lime, though in small amount, is always present, in greater or less quantity, in all vegetable substances.

"The quantity of earthy matter varies according to the age of the animal; and, in like manner, the quantity of animal matter varies also in proportion to the condition of the animal. In the best kinds of bones for manure, viz., those from fat young animals, perhaps the following proportions may give an approximation to the relative quantities of each in 100 parts:—

Earthy and saline matter . . .	40	} parts.
Cartilage and jelly . . .	40	
Fatty matter . . .	20	

The soft parts thus form, in the best bone, about sixty, and upon an average, perhaps, amount to fifty per cent., which are almost entirely constituted of the same elements of plants, and all of them, sooner or later, liable to be dissolved and absorbed by the roots. The cartilage, indeed, when the bones have been buried in a dry situation, is very indestructible; but when exposed to the action of air, water, soil, and vegetation, will probably pass into the state of jelly, and be dissolved, or otherwise decomposed,

* Doncaster Report, p. 8.