

ues, because there exists a vast amount of positive information both from practical experience and from exact scientific investigations.

Thus, organic matter from peat beds hauled out and spread on the land and incorporated with the soil produces no such effects on crop yields as are produced by good farm manure. Why? Because the peat does not decay readily so as to furnish plant food, either by its own decomposition of by liberating it from the soil; and yet the peat has a great power as farm manure for physical improvement of the soil.

Manure made from clover hay and heavy grain rations has much greater value than manure made from wheat straw. Why? It is because they affect the physical conditions of the soil in different ways? No; the greater dif-ferences in value is due to the difference in plant food and in rapidity of decay.

At the famous agricultural experiment station at Rothamsted, England, on a field to which no manure and no plant food have been applied, the average yield of wheat has been 12.9 bushels per acre for more than half a century. Land treated with a heavy annual application of farm manure has produced 25.5 bushels of wheat per acre as an average of fifty-five years. Another field, treated with commercial plant food without organic matter, has pro-



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stood and always borne in mind that the great value of farm manure, especially in profitable systems of permanent agriculture, is due to the plant food it contains, and that the greatest problem in the handling of farm manure is to prevent the loss of plant food.

The value of average fresh farm manure is about \$2.25 a ton, either when determined by chemical analysis on the basis of present market values for the plant food contained in the manure or when determined by the value of the duced 37.1 bushels of wheat per acre as | increased crop yields produced when the

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an average during the same time. The latter field received a little less plant food than was furnished in the manure, thus furnishing ample proof of the value of plant food supplied, and showing that the physical effect of the farm manure was by no means so important.

Nevertheless, the physical effect should not be overlooked. Under certain seasonal conditions this physical value may be very important. Thus, in the very dry season of 1893 at Rathamsted the land fertilized with commercial plant food produced only 21.7 bushels of wheat per acre, while the farm-manure plot produced 34.2 bushels the same year.

In semi-arid regions the physical condition of the soil and its power to absorb and retain moisture may be the controlling factor in crop yields, but where the average annual rain fall is twenty-eight inches (as at Rothamsted) or thirty-seven inches (as in Illinois), with a fairly uniform distribution during the growing season, the physical conditions of the soil in relation to crop yields may be compared to the shelter and other physical surroundings provided for live stock. In other words, under normal conditions the controlling factor is food, for crops as well as for live stock.

While manure has some value forphysical improvement and a larger valne for its power to liberate plant foodfrom the soil, it should be clearly under- pasture.

manure is applied to the fields in ordin-

ary crop rotations. This means that a pile of average fresh farm manure containing 100 tons is worth \$225. If exposed to leaching

from heavy rains during only two or three months in the spring the value will be reduced, as a rule, from \$225 to about \$150 by the loss of plant food without much reduction in total weight. Indeed, the total weight is frequently increased under such conditions because the rain water that remains in the manure may be in greater amount than the urine that has been washed out. Fermentation and additional leaching during the summer may easily reduce the value to \$100 or less.

There are two satisfactory methods for handling manure. One of these is to haul and spread the fresh manure daily, or at least two or three times a week. For this purpose a manure spreader, or at least a wagon used for this work on-

ry, is very useful and almost necessary. The other method is to allow the manure to accumulate in the stall or covered feeding shed while it is constantly tramped by the animals and kept moist by the liquid excrement, sufficient bedding being used to absorb the excess and to keep the stock clean, and then to haul and spread it on the land when conditions permit. It should not be left, however, to dry out and heat and decompose in the stalls or sheds long after the animals have been turned out to STUDY AT HOME

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