

of manure? Agriculturally speaking, the value of a mixen or dung-heap depends, first of all, on the amount of nitrogen, potash, and phosphoric acid it contains, and then upon the state of availability in which those three elements are; to these may be added its contents of potential humus.

Solid dung is the undigested portion of the food; urine contains products from that portion of the digested food that has done its work in the animal, but has not been converted into flesh, milk, wool, etc.

Why is the urine, weight for weight, of greater manurial value than the dung? Not only because of its larger per centage of plant-food, of nitrogen, and potash especially, but also because these constituents are immediately available for the nutrition of plants. Nitrogen, present in urine as urea, is quickly converted into easily assimilable plant-food, whereas the nitrogen in the undigested food in dung is slow to undergo the needful change.

In manure, 90 per cent of the total potash is to be found in the dung, as well as all the phosphoric acid and the lime, except in the solid excrement of the horse; but as regards nitrogen, one-half, or even more of it is found in the urine.

The composition and digestibility of the food will have much to do with the relative proportion of the fertilizing constituents in the solid and liquid excreta. On this point Warington speak as follows:—"If the food is nitrogenous, and easily digested, the nitrogen in the urine will greatly preponderate; if, on the other hand, the food is one imperfectly digested, the nitrogen in the solid excrement may form the larger quantity. When poor hay is given to horses, the nitrogen in the solid excrement will somewhat exceed that contained in the urine. On the other hand, corn and cake yield a large excess of nitrogen in the urine."

The quality of the excrements, manurially speaking, depends upon the kind of the animal, the food it eats, its age, the condition and employment it is subjected to.

Approximately speaking, the value of the fresh solid dung of farm-animals runs as follows: sheep, pigs, horses, cows.

The urine may be classified, as to value, thus: sheep, horses, cows, pigs.

Boussingault, a celebrated French chemist of the earlier part of the century, gives the following

as the composition of mixed excrements, i. e., urine and dung together:

	NITROGEN		PHOSPHORIC ACID		POTASH	
	Per cent.	Per ton.	Per cent.	Per ton.	Per cent.	Per ton.
		Lbs.		Lbs.		Lbs.
Horse, mixed excrements....	.705	24.1	.25	5.0	.134	2.68
Cow " ".....	.547	19.1	.08	2.6	.304	6.08
Sheep " ".....	.71	14.2	.29	5.0	.87	17.4
Pig " ".....	.37	7.4	.28	5.6

By which it will be seen that the mixed excrements of the horse and sheep contain almost equal quantities of nitrogen and phosphoric acid, and that the mixed excrements of the pig contain more phosphoric acid than that either of the other three. The mixed manures of horse and cow supplement each other, the former being rich in potash, the latter in the other two elements.

The composition of the excreta of animals is affected by:

Their food; the richer the food, the richer the excrements. If the food is rich in albuminoids, the more nitrogen will their dung and urine contain; and the same holds good as regards potash and phosphoric acid. And the digestibility of the food is of great importance, as any one can see at a glance.

As showing this effect of diet upon quality and quantity of manure produced, we may insert the subjoined table containing results obtained at Rothamsted by Lawes and Gilbert. The figures are from an experiment with cows fed with mangels (a poor food), and lucerne, or alfalfa, hay (a feeding stuff rich in fertilizing elements):

Fresh Manure per day.	MANGELS.		LUCERNE HAY.	
	Solid Excrement, 42 lbs.	Urine, 18 lbs.	Solid Excrement, 48 lbs.	Urine, 14 lbs.
	Per cent.	Per cent.	Per cent.	Per cent.
Water.....	83.0	95.94	79.70	88.23
Nitrogen.....	.33	.124	.34	.154
Phosphoric acid....	.24	.012	.16	.006
Potash.....	.14	.577	.23	1.690

Age of the stock, too, affects the quality of the dung they yield; for it is clear that the young animals has to provide for the growth of the frame and lean flesh, which are already nearly entirely formed in the matured beast.

"Stated approximately, 50 to 75 per cent of the three elements, nitrogen, phosphoric acid, and potash of the food of the former will be found in