

From the American Farmer.

MANURES.

A Prize Essay, By S. L. Dana.

SECTION SEVENTH.

Of the Circumstances which affect the Quality and Quantity of Dung.

That we may reduce to some general principle, easily understood and easily remembered, the fact scattered up and down, among the mass of writers and observers, about the different quality of manure, afforded by different animals, or the same animals at different times, let me, reader, request your company while I walk into a new department of your chemistry. You may not understand the reasons of this difference in manures; why, for instance, fattening cattle give stronger manure than working oxen, without going a little into the mode how animals are nourished. The whole may be stated in plain terms, thus:—All food serves two purposes. The first is to keep up the animal heat, and this part of food disappears in breathing or in forming fat; that is, after serving its purpose in the animal body it goes off in the breath or sweat, or it forms fat. It is so essential to the action of breathing, that we will term it food of breathing or the breathers. The second purpose answered by food, is, to build up, sustain, and renew the waste of the body.

Now all this is done from the blood. To form blood, animals must be supplied with its materials ready formed. They are ready formed in plants; and animals never do form the materials for making blood. We may therefore term this kind of food the blood formers. We have then two classes of food; the breathers, and the fat formers, and the blood formers. If we look to the nature of these different classes, we find that sugar, starch, and gum are breathers. Now there are three principles found in plants, exactly and identically the same in chemical composition with white of egg, flesh, and curd of milk. Now these three principles, exactly alike, whether derived from animals or from plants, are the only blood formers. I shall not, reader, tax your attention further upon this subject, than to say and to beg you remember these important facts. First, all food for breathing and forming fat contains only these three elements, oxygen, hydrogen, and carbon. Secondly, all food for forming flesh and blood, in addition to these, contains nitrogen.

This is the gist of the whole matter, so far as relates to manure. Bear in mind, as you go on with me, reader, that fact, that of all the food animals take, that alone which can form flesh and blood contains nitrogen. The door is now open for explaining why age, sex, kind of employment, difference of food, difference of animal, can and do produce a marked difference in value of different manures. And first let us consider how the quantity is affected; this depends on the kinds of food. The analysis of cattle

dung which has been given, is that of cows fed on hay, that is, herd's grass, red top, &c., or what is usually termed, English hay, potatoes, and water. The cattle kept up the year round; an animal, so treated, consumed in seven days:—

Water,.....	611 lbs.
Potatoes,.....	87 lbs.
Hay,.....	167 lbs.

During this time she dropped clear dung 599 lbs., or very nearly a bushel of dung a day. Every attention was here paid to accuracy of measurement and weight. The annual amount of dung from one cow exceeds by this account that which is usually assigned. But, as it is a matter of some importance for the farmer to estimate what the produce of his stock may be in dung, the following statement, containing the results of a large establishment, will probably give that average.

At this establishment the cows were kept up the year round for their dung. It was collected for use free from litter, and measured daily into large tubs of known capacity. The average number of cows kept was fifty-four for nine and a half years. During that time they consumed of beets, meal, and pumpkins, brewery grains, corn-stalks, turnips, potatoes, carrots, and cabbages, 942,436 lbs., giving an average of green fodder, for each cow, per annum, 8,164 lbs. The total dung for nine and a half years was 120,520 bushels, or per cow per annum, 235 bushels. This gives a daily consumption of green food, 5 lbs., and 22 lbs. of hay per cow, and two and about a half pecks of dung per day, or 56 lbs. per cow.

But, according to some experiments, made to determine how much the quality of the food affected the quantity of dung, it appears that the solid and fluid excrements partially dried, were, compared with the food, as follows:

In	Cattle.	Sheep.	Horses
	lbs.	lbs.	lbs.
100 lbs. of rye straw gave dung	43	40	42
100 lbs of hay " "	44	42	45
100 lbs of potatoes " "	14	13	
100 lbs. of mangel-wurtzel " "	6		
100 lbs. of green clover " "	9 1/2	8 1/2	
100 lbs. of oats " "	49	51	
100 lbs. of rye " "			53

My own experiments on this subject gave for 100 lbs. of hay and potatoes as above, estimating both as dry, or free from water of vegetation, 32.9 lbs. of dung, and this estimate as dry is reduced to 5.6 lbs., or 26 lbs. of dry food gave 14 lbs. of dry dung. But as general facts, we may say, that well cured hay and the grains, give one half of their weight of dung and urine; potatoes, roots, and green grass, about one tenth. It will be easily understood why the quality of food should affect the quantity of dung. The more watery, the less in bulk is voided, because there is actually less substance taken. And as the animal requires this to form its flesh and blood and fat, and to keep up his breathing, so will he exhaust more completely his food. More going to support him less is return-

ed by the ordinary channels. So when much vegetable fibre exist, as in chopped straw and hay, then, as it goes but little way towards supporting breathing or forming blood, a greater bulk is rejected. In grains, on the contrary, which afford much of all that the animal requires, less is extracted and more voided. These circumstances are intimately connected.

The Quality of the Dung.

It is affected first, by the season; second, by the age; third, by the sex; fourth, by the condition; fifth, by the mode of employment; sixth, by the nature of the beast; seventh, the kind of food.

1st. The season; it is because digestion is worse in summer than in winter, a general fact, that summer manure is best. And where cattle are summer-soiled, it is said the manure is worth double that from stall-fed winter cattle. I do not think much is to be attributed to the worse digestion in summer, but the cause of this great difference in value, is to be found in the fact, the soiled cattle generally get a large proportion of blood-forming food.

The wear and tear of their flesh is little, and hence, requiring little of their food to keep up their flesh, a greater portion goes off in dung, which thus becomes rich in ammonia. The green plants, rich in nitrogen, afford abundance for milk, which being rich in all the elements of cream, should afford large returns of butter.

2nd. Age; from the fact, that young and growing animals require not only food to form flesh and blood, to repair the incessant waste and change taking place in their bodies, as in older animals, but also a further supply to increase the bulk of their frame, it is evident that their food will be more completely exhausted of all its principles, and that also less will be returned as dung. All experience confirms this reasoning, and decides that the manure of young animals is ever the weakest and poorest.

3rd. The sex. This is one of the most powerful of the causes which affect the strength of dung. From the remarks which have been already made, and which I trust, reader, are now fresh in your memory, of the important part acted by nitrogen in dung, it must be plain why sex should exercise such influence.

1st. In all food, as we have explained, that only which contains nitrogen, can form flesh and blood, or substances of similar constitution, that is requiring a large proportion of nitrogen, as milk. Hence an animal with young, that is a cow before calving, requires not only materials for its own repair, but to build up and perfect its young. Hence the food will be most completely exhausted of its nitrogen, and consequently the dung becomes proportionably weaker.

2nd. The young having been formed, then milk is required for its sustenance. Milk contains a large proportion of ni-