

From the American Farmer.

MANURES.

A Prize Essay, By S. L. Dana.

SECTION NINTH.

Of the Causes which make Urine better or worse, more or less. The Modes of Preserving it.

There can be no doubt, that the same causes which we have pointed out as affecting the value of dung, affect also the urine.

We have already alluded to the four chief circumstances to be regarded in urine. And first, of its composition. It will be affected by the age, sex, food, and difference of animal. The process of forming urine is the same in man and animals. Now if we reason here, as we surely may, from analogy, then the effect of age and sex upon the quantity of the essence of urine, or urea, will appear from the result of one hundred and twenty analyses of urine:—

In 25 hours there are discharged by men 432 grains of urea, by women 203 grains of urea, by old men, from 76 to 80 years of age, 122 grains of urea, by children, 8 years of age, 203 grains of urea, and by children, 4 years of age, 70 grains of urea.

It will be recollected, that each grain of urea is equal to a grain of carbonate of ammonia of the same, so that a healthy man discharges daily about an ounce of this salt. If, then, other animals are affected by age and sex, as is the human species, then we may say that bulls and oxen give a better urine than cows, steers better than calves, and a venerable old cow gives as much of the essence of urine as two calves.

Food affects the quantity of water, and that acting merely to dilute the urine, renders it weaker in salts for a given amount, though perhaps not the daily amount of salts. Supposing the animal well fed, so as to keep up the wear and tear of his blood and flesh, then as the urine derives its chief value from the worn out materials of the body, the actual amount of urea daily discharged may be the same, though the amount of the urine may vary considerably. We may increase the amount of salts and acids by particular food, but this can never be continued long enough to change materially the character of urine as a manure. Difference of animals has also a great effect on the quality of urine. The more active, the greater the wear and tear of the flesh, the better the urine in working animals. Where the animal is stall-fed, there no doubt the urine is still richer, and the urine of fattening animals is still more valuable. Hence of all animals, commend me to swine, as manufacturers of ammonia. Cast your eye on the table of the amount of urea or ammonia furnished by various animals. No one exceeds the hog. He seems especially favored by nature for this office. He eats everything. His habits require very little of that class of food which forms flesh and blood. He

is a fat-former, a magazine of lard, a real oil-butt, and demands, therefore, the food essential to form fat and keep up his heat. He returns of course, having little lean meat to form (nobody would praise him for that.) having little flesh to form to increase his size, he returns quickly the waste his body suffers as urea, which becomes ammonia. But it is only the still, and quiet, and penned animal, which gives this valuable product. If we would cause him simply to produce the greatest amount of his manufactory, without taking into account his labor in shoveling over the compost heap, perhaps no better rule can be given, than the Shaker practice of feeding with lettuce leaves. Having little brains to replenish or build up, and not quick in his nerves, (for be it known to you, reader, the opium of lettuce leaves is supposed to contribute mainly to the formation of brain and nerves,) the opium-eating hog will return a vast amount of the nitrogen of his lettuce, in the shape of ammonia. If now you add to the facts, common to the nourishment of swine, the action of ammonia on mould, as it has been explained, you will see, that he who neglects to fill his yards with mould, and swine to convert it, overlooks one of the cheapest, most effectual, and certain modes of forming manure, which practice and theory unite in pronouncing the surest element of the farmer's success. Not only is the quality of urine affected by age, sex, food, difference of animal, but the season also exerts an influence upon this liquid. The urine of cattle often contains ammonia ready formed in summer, but never in winter. In cold weather the amount of ammonia, or rather the principle affording it, is less; often it is not half in winter what it is in summer. This certainly is a misfortune to the farmer, who generally keeps his cattle up only in winter; but then it is an argument also for the practice of summer soiling.

Secondly, with respect to the circumstances necessary to change urea to ammonia; or, in short words, to fully ripen urine, or to make it a fit manure. These also depend upon the season, in part. It is to be remembered, reader, that this rotting of urine is only fermentation. It takes place because there is a principle in urine which brings on fermentation, just as it does in new cider. Now if it is by fermentation that urine rots, it will take place, as all fermentation does, best at a moderate temperature. The cold of winter will prevent it. Hence your winter manure must be allowed time, as the heat of spring comes on, to ferment, that the urine may be changed to ammonia; and every means must be taken to prevent the heat rising beyond, in the manure heap, or falling below a moderate temperature warmth. These are the circumstances which chiefly promote the change from urea to ammonia.

Thirdly, in regard to the time in which this change will take place, it will require at least one month; and six weeks are better. If urine be allowed to rot for a

month, it fully doubles its quantity of ammonia. In fact, it would have contained more than double the ammonia of fresh urine, had not a portion escaped.

This brings us to our fourth point, the best mode of preventing the flying off of the ammonia when this change has taken place. Much has been said about tanks, and vats, and urine pits, and many plans devised for preventing the escape and the loss of volatile ammonia. But when once the action upon mould, is understood, as we have already pointed it out, I am persuaded, reader, that those tanks, and vats, and urine-carts, will appear to you not only expensive and cumbersome, but useless. Your first point is, to save your ammonia, your second is, never to use urine in its caustic state. If you do you will as assuredly burn your crop, as the puddle formed by a cow burns the grass upon which she empties her watering pot. Here the urine, forming caustic ammonia, acts as would caustic potash, or a lump of stone lime, left to slack upon the grass. You want to change this burning or caustic ammonia into mild ammonia, or to combine it with some substance which has not only that effect, but also keeps it from flying away. Unless you understand, then, the principles of these actions, and apply them too, your labour is all vanity, when you attempt to save your own or your cattle's urine.

These principles are in number, two. First, the principle which changes caustic to mild ammonia, is carbonic acid, derived from air, or decomposing mould. Second, the principles which render ammonia less volatile, or wholly fixed, are certain acids formed in mould, as sour mould or certain salts which give up their acid to the ammonia. Plaster does this, by changing its lime for ammonia. Now let us go into the reason of this a little, and see if we can understand it. Very slowly, and supposing moisture present, the oil of vitrol of the plaster quits its lime, and unites to the ammonia, and so changes a volatile into a fixed salt. Now this is a change which has been of late much insisted on, and the practice recommended, of strewing the stable and barn cellars, and even the privies, with plaster, to save the ammonia, which escapes in these places. But it is doubtful whether the saving is as great as is usually supposed, for the ammonia arising from the urine is caustic, it flies off as caustic ammonia, that has no effect upon plaster. To produce this mutual effect of ammonia and plaster, the caustic ammonia must previously have been made mild. However, this plan is applicable only on a small scale. Copperas, alum, common salt, potashes and wood-ashes, all act to fix the volatile ammonia, and have all been recommended for this purpose. But it is easily seen, that, in employing some of these substances, is to buy ammonia almost at apothecary's price. These practices will be followed, therefore, only by those who place the crop and its value upon ammonia; this is a limited and narrow view. The true and farmer-like, as well