AGRONOMY

Edited by Prof. J. C. Hogenson.

STARTLING FACTS ABOUT MANURE.

Vast Losses Through Lack of Knowledge in Handling—Several Time-Honored Beliefs Disproven by Official Experiments.

American farmers lose between 100 and 125 million dollars a year through wasteful practices in the handling of manure, according to authorities on agriculture and fertilizers. The great bulk, if not all, of this waste could be easily saved; in fact, it would be saved if American farmers were German farmers, or at least it would be saved by the farmers of Germany or any other of the old countries where every ounce of soil fertility is scrupulously conserved.

The average successful farmer who may read this statement will say very complacently: "Why, I wonder how? It doesn't strike me, anyway, for I know the value of good manure and I use every bit of it that I can get." But just a minute. Are you certain that you make the best use of all your manure? When you haul a ton of manure onto the field, is its fertilizing content all that it should be and are you sure that from 10 to 50 per cent of its fertilizing value has not been dissipated through leaching, fire-fanging or lack of provision to absorb or conserve the animal urine? Take as an instance the case of urine alone: A cow will produce 40 or 50 pounds of solid manure a day, but she will also make from 20 to 30 pounds of urine and fully one-half of the nitrogen in her ration goes into that urine. So it is important to conserve the urine.

Prof. Taliaferro of the Maryland Agricultural Station says that even though manure is highly regarded by all farmers in sections where fertilizers are needed, nevertheless there is probably no product of equal value which is so much neglected and so poorly cared for. The first great source of loss, he says, is through the incomplete absorption of the urine and that it is not infrequent to see no attempt being mad eto save this portion of the manure in spite of the fact that it is richer in both nitrogen and potash than is the dung and that these ferilizers are more available for the plant in the urine than in the dung.

Great Loss, Through Leaching.

The second greatest source of waste of manure is the loss incurred by leaching. If manure is piled against the side of the stable where the water from the eaves can drip on it, or if it is piled on a slope or other exposed places, every heavy rain washes out large quantities of nitrogen and potash. These leached chemicals are the most valuable portions of the pile, the most available for plant forcing.

The third common source of loss is that incurred by heating and fermenting. When manure is put in piles it soon heats and throws off more or less gas and vapor. The fermentation which produces these gases is caused by the action of bacteria or minute organisms. The bacteria which produce the most rapid fermentation in manure, in order to work their best, need plenty of air, or, more strictly, oxygen. Therefore fermentation will be most rapid in loosely piled manure. Heat and some moisture are necessary for fermentation, but if the manure is wet, fermentation is checked because the temperature is lowered and much of the oxygen excluded from the pile. The odor of ammonia, common around a stable, is a simple evidence of the fermentation and loss which is going on.

Surprising Losses in Weight and Strength.

Fresh manure loses in the process of decay from 20 to 70 per cent of its original weight. An 80-ton heap of cow manure left exposed for one year lost 66 per cent of its dry substance. Some tests conducted by the Cornell Experiment Station showed that 2 tons of horse manure exposed in a pile for five months lost 57 per cent of its gross weight, 60 per cent of its nitrogen, 47 per cent of its phosphoric acid and 76 per cent of its potash. Five tons of cow manure exposed for the same length of time in a compact pile lost, through leaching and dissipation of gases, 49 per cent in gross weight, 41 per cent of its nitrogen, 19 per cent of its phosphoric acid and 8 per cent of its potash. Here was a waste, veritably, yet no greater than is to be found in much common farm practice. What would it reduce to in dollars and cents?

Take the horse manure, as showing the greater waste. A ton of average fresh horse manure, from animals fed an ordinary balanced ration, contains about 10 pounds of nitrogen, 5 pounds of phosphoric acid and 10 pounds of potash. Of course the quantities of these fertilizing chemicals in manure vary with the animal's ration. A cow-pea or clover ration, for instance, is much richer in nitrogen than one of timothy or corn fodder. But taking these figures as a basis:

One Ton of Average Manure.

Nitrogen, 10 lbs., 60 percent loss, or 6 lbs., at $0.15	$0.90
Phosphoric acid, 5 lbs., 47 percent loss, or 2.4 lbs., at $0.06	.14
Potash, 10 lbs., 76 percent loss, or 7.6 lbs., at $0.04½	.34
Total loss in value per ton	$1.38

Here was a loss of $1.38 per ton out of a total estimated value of $2.25 per ton, which is a fair valuation for a ton of average fresh horse manure.

The remedy for such—greater or less—losses is simple. The first step to prevent the loss of the fertilizing elements in manure is to provide plenty of bedding or litter in the stable to absorb and save all the liquid parts. The losses due to fermentation can be greatly checked by mixing horse manure with cow manure and making the piles compact so as to exclude the air, and by thoroughly wetting the manure, which will assist in excluding the air and also reduce the temperature. The use of chemical or mechanical absorbents, such as plaster (gypsum), kainit, finely ground phosphate rock (raw), etc., in the stable, or sprinkled over the manure, assists in preserving the manure, absorbing the liquids and preventing loss of gases. Loss from washing or leaching may be prevented by piling manure under cover or in basin-like depressions where there is a clay foundation; or still best of all, by hauling out directly to the field and spreading it as soon as produced.

"There were no better manure savers than some of the thrifty old Scotch farmers," said Secretary Wilson, of the Department of Agriculture, in speaking of manure waste. "Their practice was to dig a considerable hole in clay and put the cows down into this. The animals tramped everything down compactly, and when the hole was finally full, the manure was in almost ideal shape. It had retained practically all of its strength and fertilizing value. However," continued the Secretary, and in this he is supported by the consensus of agricultural practice and opinion, "the ideal way on the average farm is to follow the plan, all through the year, of hauling manure directly from the stable to the field and spreading it at once, at the same time providing plenty of straw or other bedding material in the stable to retain all the urine."

"How's that?" can be heard from several sides. "Surely Secretary Wilson, who is a most practical farmer, as well as a "professor," certainly didn't say to haul your manure out any month during the year. Why, anybody, most, knows that if manure is hauled and spread in midsummer, the sun will scorch it to a tinder and burn out all the good."

Well, it does, perhaps, look reasonable to suppose that it would be better practice to put the fresh manure into the Scotch pit and have it tramped down to spread it out on the field and have it burnt up by an August sun; but the facts are otherwise, and while the manure pit way is second best, Mr. Wilson knew just what he was talking about and has plenty of support for his statement that the ideal way to handle manure is to haul it directly onto the field and spread it, at any time during the year. The government agricultural station in Maryland, just outside of Washington, decided to determine this matter accurately and its experiments have exploded two very common beliefs, the summer burning theory being one of them. The other common belief which has been proven wrong is that it is better to plow manure under in the fall than to leave it exposed on the land's surface during the winter and then plow it under in the spring. In the first instance manure spread in July and allowed to stand until the following spring gave better results than that spread in October and still better results than that spread in the following spring just before plowing. In the second experiment better yields were secured after allowing the manure to lie on top of the land all win-