SOIL FERTILITY AND MANURES.

H. A. BRIGGS, Elkhorn, Wis.

Mr. Chairman, Ladies and Gentlemen:—As has been said, this subject of soil fertility and manures is a most important one for farmers to consider, not only in Wisconsin, but all through the United States, and the more I have traveled with the Farmers' Institutes and have heard discussions on this subject, the more I am convinced that it cannot be enforced too much. twenty or fifty years? I think we can all do it if we run our farms intelligently and grow such crops as we can grow to advantage, and feed them out on the farm intelligently.

Manural Value of Different Feeds.

When we speak of fertility from a farmer's standpoint, we generally

<table>
<thead>
<tr>
<th>MANURAL VALUE OF FEED STUFFS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NITROGEN □ □ □ □ □ PHOSPHORIC ACID □ □ □ □ □ POTASH □ □ □ □ □</td>
</tr>
<tr>
<td>COST: 12° 4½° 4½° per lb.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POUNDS OF FERTILIZING INGREDIENTS PER TON</th>
</tr>
</thead>
<tbody>
<tr>
<td>FERTILITY VALUE</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>$4.05</td>
</tr>
<tr>
<td>TIMOTHY HAY</td>
</tr>
<tr>
<td>CLOVER</td>
</tr>
<tr>
<td>WHEAT STRAW</td>
</tr>
<tr>
<td>CORN</td>
</tr>
<tr>
<td>BARLEY</td>
</tr>
<tr>
<td>OATS</td>
</tr>
<tr>
<td>WHEAT</td>
</tr>
<tr>
<td>WHEAT BRAN</td>
</tr>
<tr>
<td>PEAS</td>
</tr>
<tr>
<td>LINSEED MEAL-O-P.</td>
</tr>
<tr>
<td>CHEESE</td>
</tr>
<tr>
<td>BUTTER</td>
</tr>
<tr>
<td>BEEF</td>
</tr>
</tbody>
</table>

Now, the chemist will tell us that the fertility in our soil will certainly become exhausted if we crop it continually, thus using all the available fertility that there is in it. Now, how can we manage our farms so as to get the most money out of them and still leave them to our children in better shape for the next generation after we have handled the land for ten, fifteen, speak of his barnyard manures, such as he is accumulating from day to day on his farm. These vary in quality a great deal according to the quality of the feed. For instance, corn fodder has not nearly the fertility in it that clover hay has; clover hay has not as much as wheat bran. Charts giving the relative value of different feeds appear from time to time in our
bullets, and should be carefully studied.

How can we handle the manure on our farms to the best advantage and save all the fertility, or nearly all the fertility, that there is in it? When a man starts to build a barn he should always have this matter in mind and should build so as to save all the liquids as well as the solids; he should build for the convenience of his stock as well as for convenience in getting this fertility on the land.

My Method.

Since I have given this matter careful attention, my plan has been to take the manure from the barn to the field every day, as nearly as possible. Of course there are some scatterings in the yard that we cannot get every morning, but five-sixths of all the manure that is made on the farm goes direct from the barn to the fields. I know there are a great many farmers who say that it goes to waste in the field, that it ought to be decomposed beforehand. Well, now, the chemist tells us that we can add nothing to its fertility by decomposing it; it is never better than when it is first made, and by getting it on our land, especially on our grass land, there is but little waste, not any, in comparison to what it will be if left in our yards or in piles back of the barn to heat and mould. I was considerably interested about a month ago in going into a barnyard in Southern Wisconsin, where I supposed every farmer took the best care of his manures, to find that his cow manure was piled in a great pile back of the barn, as high as he could pitch it, and that the liquid manure was running off in little rivulets. His horse manure was piled up back of his horse barns and was steaming and heating, and the ammonia passing off into the air. Now, if he had piled his horse and cow manure together, there would have been moisture enough in the cow manure to retain the ammonia in the horse manure, and kept it from heating; but he was only looking at the one thing of getting it out of his barn, regardless of saving the fertility that was in it.

Absorbents.

If you are not situated so as to be able to get the manure right from the barn to the field, then you should provide a good shed for it, with a tight floor, which may be of plank, cement, or solid clay—anything that will prevent it from leaching away. It should be covered so that it will not get an excessive amount of rain. In that way we can save the fertility in it, but we must have moisture enough to keep it from heating and going off in ammonia. Another thing; in order to save the fertility in our barns, we want to be sure to have some kind of absorbent to take up all the liquid manure. Nearly all the farms in Wisconsin are using straw or corn fodder for this purpose. If you will run your corn fodder through a corn cutter or shredder, that makes the best kind of an absorbent. It will take it up like a sponge. I like it much better than straw; I have noticed where we have used the corn fodder that the floor would be perfectly dry in the morning.

Now, I spoke of feeding our stock on the farm with a view to the manurial value. We should make that more of a study that we may get the best returns out of such feeds, and I know of no kind of stock that is better for keeping up the fertility on the farm than the dairy cow or the mutton sheep. They are the two classes of live stock that are paying the farmer, as a general thing, better than any
other kinds of live stock, and also putting fertility in the very best shape possible, where we can get the best results from it.

A Good Plan.

My method of handling the manure is to spread it on grass land. I prefer grass land because the clover or the timothy stubble and roots retain all of the liquid that there would be in case of a rain. The objection often comes up that so much of it will run away when a little rain or snow comes. Now, a person who has watched that very closely will find that it runs but a very little distance from the place where it is first spread. I have talked with farmers who have made experiments in top dressing on grass on a side hill, and have watched the effects. In many cases where it has been observed, this running off has not been noticeable more than eight or ten feet from where the manure was spread.

Another great advantage in this system is that it helps to get a catch of seeding, which is quite difficult in much of the land in Wisconsin, particularly on our sandy farms. You can nearly always get a catch by sowing fall grain and top dressing it with stable manure, or even dry straw, or anything you have about; then sow grass seed in the spring and you will seldom have a failure. The manure acts as a mulch; and all the fertility that is in it goes in the ground; rain coming in the fall and winter, and the snow, breaks down the solids in the manure and gets it just where the plant life can get a good hold of it early in the spring.

DISCUSSION.

Mr. Kellogg—Would you advise putting manure on side hills if there was ice there, as at the present time?

Mr. Briggs—I haven't seen any ice that I thought would do any damage. Of course, if there was very much ice I should keep it until the ice was gone.

Mr. Hanchett—What would be the effect this year where the ground is frozen six or seven feet deep, if we should have heavy rains?

Mr. Briggs—if it is put on grass land, on clover sod, when there is moisture enough and heat enough, so that the surface will be thawed out, the liquid manure will filter through the grass roots, and there will very little fertility run away.

Mr. Scott—What would be the loss if the manure is allowed to remain in the yard?

Mr. Briggs—it would depend a good deal upon the condition that it was left in. If it was spread out, as it is in many farmers' yards, from six inches to two or three feet, lying there all summer and the stock running through it, I should think there would be seventy-five per cent. of it go to waste. If it was piled up in good piles and taken care of, perhaps there would not be more than thirty or forty per cent. of it get away.

Mr. Scott—Would there be as much if you pile it in the fall?

Mr. Briggs—No, if you pile it in the fall, it freezes up and there is practically no waste, but what I am looking out for in all my farm work is to save work. Where a farmer has a whole lot of boys and girls, more than he knows what to do with, it may be an advantage to work as unhappily as is possible, but where you have to hire the work done, it makes extra cost every time you handle a forkful of manure. If a man has his barn built properly and the floor so he can drive through, he can put it onto a sled or wagon and take it into the field and
dump it cheaper than any other way that he can handle it.

The Chairman—When a man is selling off some of his crops from his farm and buying food for his stock, isn’t it well to take into consideration the manurial value of these feeds?

Mr. Briggs—It certainly is. We find that bran, oil meal, and cotton-seed meal are not only richer in feeding value, but are much richer in manurial value. There is where the cow comes in as being an excellent animal for keeping up the fertility, because we have to feed her more of this protein food, and that supplies in the manure the nitrogen that we need in our land.

Mr. Arnold—The value of manure depends on the quality of the feed. The chemist tells us that sheep manure is worth twice as much as cow manure and horse manure, when fed upon the same article. Now, isn’t there a good deal of truth in what the farmers generally believe, that if you keep a lot of sheep, you can enrich your farm to a larger extent than in any other way? Is there any method whereby the animal can add to the fertility of the food he consumes? If the sheep eats the same food as the cow, and the manure is worth twice as much, I would like to know why.

Mr. Briggs—I don’t think it is worth twice as much. It is in a more condensed form, less water in it.

Mr. Arnold—Well, the liquid manure from the cow is worth more than the solids, so that does not explain it. We learn from the professors themselves that analyses show that sheep manure is worth twice as much as cow manure.

The Chairman—But there is only half as much of it.

Supt. Mc Kerrow—It is in a more condensed form.

Mr. Bradley—Do you think that if you fed a bunch of sheep ten tons of clover hay and ten tons of bran, and that if you fed a cow the same thing, and came to analyze the manures, that the sheep manure would be worth any more than the cow manure? If you are feeding to a dairy cow she will possibly take more out of it than the sheep will. If that is so, of course we get it back. It does not seem to me that the cow does get out of her food any more than the sheep, and certainly the manure would be just as valuable after all the products were taken into consideration.

Supt. Mc Kerrow—Is it not a fact that the manurial value from a given amount of feed will vary with the same animal? For instance, if this is a young growing sheep, it will extract more nutriment from the same amount of feed than an older sheep. The same dairy cow will extract more out of her food at one time than at another. The conditions of the animal are to be taken into account as well as the feed.

Mr. Briggs—in feeding to our live stock, certain animals take out of that feed and put back onto the land less than others. You spoke of the dairy cow. She is giving large quantities of milk, and of course it takes more protein out of that feed and there is less to go back on the land. It is the same with a growing animal.

Question—What is the object of plowing under?

Mr. Briggs—In some kinds of soil it is of great benefit. You get the vegetable humus in the soil and it lightens it up, so that it will take and hold moisture better, and the roots can penetrate the soil to better advantage than they could where it is a very heavy clay soil. But the main thing is to get it so it will hold moisture better; for instance, in the State of Michigan I understand they have been cropping for a number of years and putting no
DISCUSSION.

fertility back on the farms, except commercial fertilizers. They have had rainfall in the last year of something over eighteen inches of water and still they are complaining of drought. By experiments at the Experiment Station they found that the soil was destitute of humus and vegetable mould; they had plenty of fertility but they lacked humus, and that the soil with the proper amount of humus would hold fifty per cent. more water than the other. The humus holds the water in the soil so that the crops can get at it and feed on it, and also aids in breaking down the fertility.

Question—Did you ever try putting this coarse manure in new seeding of clover?

Mr. Briggs—Yes, if I hadn’t any other crop to put it onto, I would either pasture it or cut a crop from it. By spreading it thin, not later than the first of April, the rains and snows come on during the winter and break it down, and by going over it with a brush or harrow there will be but little that will rake up, and it will do very little damage. You can put your hay into the hay mow with much more moisture in it if it has some of the coarse straw in it. I never have found it to be any disadvantage, but rather a benefit.

Question—How would it do to spread that coarse manure on fall plowing?

Mr. Briggs—That would do very well if we did not have any rains or snows to wash it off. But clover or grass land is superior to fall plowing, because the roots and fiber retain the fertility, whereas, if there is nothing to catch it, it is liable to be lost. However, I have a neighbor who practices after that method and I must say I never saw a man bring up land better or quicker; you can see the difference in the corn just as far as you can see the field. I will tell you of a little illustration of that which I noticed when I was quite small. My uncle lived on an adjoining farm to us a number of years ago, when they used to think that they must leave the manure in the yard until they cleaned house, about once a year. They drew it out and plowed it under immediately; his tenant commenced plowing around the field and had about two or three rods. In manuring that corner of the field he had nearly a load left and he spread it on this fall plowing. I happened to be present when my uncle came home, and as he drove along the road he saw what was going on, and he says, “Van, what did you put that manure on that fall plowing for? You might just as well have put it in the road. We shall get no benefit from it.” That excited my boy curiosity, and I watched it; you could see better results from that fall plowing top dressed for three or four years longer, than you could where it was plowed under.

Mr. Arnold—it has been my custom to compost manure and put it on the land in the fall of the year, dragging it in with winter wheat, and always getting a catch of clover, but Prof. Roberts says where manures are composted, there is a loss of fifty per cent. Now I want to know where that goes to.

Mr. Briggs—it depends a great deal on how it is composted. The experiment you referred to is where it was piled up in heaps in the yard and left there for six months. If that manure had been composted under a shed and just heaped up, there would not have been nearly so much waste.

Supt. McKerrow—The manure in that experiment was piled two feet deep.

Mr. Arnold—What I want to get at
is whether this loss is by evaporation or drainage?

Mr. Briggs—Both. There is very little loss by evaporation unless there is some heating going on. Just as soon as the manure begins to heat, it loses fertility very rapidly, and if you have not a tight floor, it gets away by leaching, but it does not lose very much if it is just exposed so a very little water gets on to it.

Mr. Arnold—It seems to me there is no loss by leaching where the water doesn't go through the compost heap and whatever loss there is must be by evaporation. You said in your remarks that manure is of no value until it is composted, and if you want to get immediate results, decomposed manure is the best; in my opinion the fall of the year is the ideal time to put out manure; that is nature's time and it is better than when the ground is frozen. There is no action of the elements during the winter season until the spring opens, and, as you say, while we must economize, and it is best to instruct people to get out the manure at all the seasons of the year when it is most economical, I think the ideal time is the fall of the year.

Mr. Briggs—I will agree with you there, providing we have made all of our manure in the fall and could get it right from the barn to the field.

Mr. Scott—Cannot this decomposition go on in the soil just as much as in the compost heap?

Mr. Briggs—Certainly, and that is just where I want it.

Mr. Scott—And isn't there an advantage in having it go on in the soil? The scientists tell us that it is a good thing to have our soil well provided with humus, aerating it, helping the action of the oxygen and such action in the soil will tend to develop the nitrates very rapidly, while the soil that has become depleted of humus, especially soils locked up so that the atmosphere cannot produce this action, will lose the nitrates very rapidly. I think we should have our soils well filled with humus so as to subject them to the action of the atmosphere.

Supt. McKerrow — Captain Arnold dwells on nature's plan. It is a pretty good thing to follow nature's plan, if it fits conditions, but nature's plan is to have all the fertilizing material right on the soil and not in the compost heap.

Mr. Scott—Following nature's plan, this great territory of the United States would only support two hundred thousand people. To-day it supports many millions. We have to improve on nature.

Mr. Arnold—Nature did not do any plowing. Nature furnished us with some pretty good farms.

Mr. Briggs—I want this manure to decompose—I want the plant life to feed on it just as rapidly as it is decomposing, and especially the clover plant, and then the roots will be left in the ground for humus, vegetable mould, and you will retain the proper condition in the soil; keep it there for the grain crop that is going to follow.

The Chairman—I think the farmers of Wisconsin are fortunate in having had this subject of fertility discussed at every Institute for the past ten years. I am sure that we have kept our soils in better condition than the farmers of other States on account of it.

I have been traveling around some for the last two or three years, especially in the State of Michigan. I have been attending Farmers' Institutes there, and I think that this winter I never saw that subject on any program but once, and the farming lands of Michigan need just this
CROPS TO GROW.

W. C. Bradley, Hudson, Wis.

Ladies and Gentlemen:—At an Institute meeting the other day the question came up “What is the best crop to grow on a farm?” The minister, who was present, said that he thought a crop of boys was the best crop to grow on a farm. Some one in the back part of the audience improved on that by declaring that a crop of girls was the best thing to grow on a Wisconsin farm. The minister was too much for him, and he said, “Oh, the boys always embrace the girls, so it comes to the same thing.” I think you will all agree with the minister that the crop of boys and girls growing on Wisconsin farms to-day and being educated in our public schools, perhaps not to make farmers but to make intelligent, law-abiding citizens, are the best crop that we can grow on our farms.

But there are other crops, and perhaps some of you are asking, What are the best of those other crops to grow on our farms? This will depend, first, on the farmer himself. Something depends on his family, then considerable in his location as regards distance to market. Then, something will depend on the condition of the surface of his farm, whether it is level or very rough. Then, on the condition of the soil, whether it is low, marshy, sandy, or heavy, clay soil. All of these things we must take into consideration in order to determine which are the best crops for us to grow on a Wisconsin farm.

The Stockman.

In the first place, the farmer himself will have to give these different things a good deal of thought and study in order to know what he is capable of growing. If he is a fairly intelligent, industrious, thoughtful man, who has a good deal of love of live stock feeding and the capacity for growing those different crops that he can turn into feed for his live stock, why the crops for him to grow will be such as will