and the practice of applying all the manure of the rotation to the fallow is not that of an intelligent husbandman. It is preferable to plow under an occasional crop of clover, in whole or in part, thereby enriching the surface from the subsoil and the atmosphere, and if the soil is lacking in any special constituent, it can be most cheaply supplied in the form of a commercial fertilizer. Green manuring is fast gaining favor on light soils and on other soils lacking in vegetable matter. The practice is sound both in science and in common sense. If a clover field is plowed under at the right time, say in July, there will be no loss of plant food, and fall wheat may be sown with excellent prospects for a good crop,

Experiments with Potatoes Potato Rot—Profits and Losses on Fertilizers.

(A Lecture delivered by W. A. Macdonald before the Middlesex Agricultural Council.)

No. V.

The weightiest questions yet remain to be considered. Should the potato be grown for the farmer's table, for the trough, or for the market? Indeed, these are pertinent questions in the raising of all farm crops, and I should not consider my experiments complete without giving my reasons for using the potato in preference to other farm crops to analyze my soil.

I wish to say a word about the nutritive value of the potato, and lest you should accuse me of going beyond my legitimate sphere, I will quote the words of the ablest living authority in physiology and dietetics. Prof. W. Mathieu Williams, the author of an able treatise on "The Chemistry of Cookery," says: "If I were the autocratic Czar of Ireland, my first step towards the regeneration of the Irish people would be the introduction, acclimatization, and dissemination of the Colorado beetle, in order to produce a complete and permanent potato famine."

This is bold language from so great an authority, and your curiosity will be aroused to know why this should be thus. I would not dwell on this part of the subject had I not heard that, owing to the high prices, the farmers of Middlesex county were so stingy that they were selling all their potatoes and eating other vegetables in their stead. Physiologists and hygienists have done more for the human race than all other scientists combined, doctors not excluded, and yet we are so wedded to fashion in our dietetic habits that we choose fashionable misery in preference to unfashionable happiness. We suffer more from errors in diet than from all other ills combined. We speak of feeding the refuse of our crops to our domestic animals, whereas, in truth, we eat the refuse ourselves—and that, too, for the most part, in the form of what is familiarly called the "staff of life."

The statement of the authority above quoted is easily comprehended. In examining the composition of the potato, we find that it contains only 25 percent of dry matter, about nine tenths of which is starch. I have said that the potato feeds largely on the potash salts in the soil. We should therefore expect the potato to be valuable as an article of food on account of this alkali, but these are lost in the ordinary process of cooking. It is true that baked or steamed potatoes would sustain life for a considerable length of time; but in the fashionable method of preparation, they must be regarded as useful merely for the percentage of starch they contain, the quantity of albuminoid or flesh-forming material being scarcely worthy of consideration. If the object is merely to fill up the system and give it bulk, then eat potatoes by all means, and the more mealy the potato, the better it will serve this purpose.

True, the system requires a certain quantity of starch; but our "staff of life," especially that made from the "new process" flour, as well as many other articles of diet, is also excessively starchy, and the balance of our rations is too sugary or fatty; that is, our food is too carbonaceous, and lacks in the substances which build muscle and bone. It is now plain to be seen that the potato was meant to be sold, not to be eaten or fed to your stock, and you should raise no more for your own use than will hide you from the disgrace of being called unfashionable in your dietetic habits.

Why, then, all this experimenting with potatoes? There have been more investigators in the potato field than in all other vegetable fields combined. The reason why is because the craze has taken this turn; but I want to tell you the reason why I selected the potato to inform me what constituents were most lacking in my soil. You are all aware that the composition of crops changes with the character of the soil and the nature of the manures applied. It is the nature of some plants to change in this manner more than others. Now it is plain that if a certain crop feeds readily on almost any constituent that is applied to the soil, it is more difficult to ascertain the natural deficiencies of that soil than if the crop were invariable in its composition. According to the evidence of the most reliable authorities, the potato varies less in its chemical composition than any other crop, and an excess of any given constituent applied to the soil will not find its way into the potato less readily. If potash is deficient in the soil, many plants will feed on other alkalies, such as lime and soda, in its stead; but this power of appropriation does not seem to be great in the potato. This quality in the potato fits it admirably for testing the deficient constituents of all soils, and the process is a simpler and more satisfactory one than that of chemical analysis. Whatever little value potatoes possess should be attached to their mineral constituents, so that farmers should consume those which have received the greatest quantity of mineral fertilizers.

(CONCLUDED.)

Farm Drainage.

No. X.

Cost of Draining.—It is evident that no inflexible rules can be laid down with reference to the cost, and, itemize as we may, some of our figures would be liable to objections in some quarters. Some men do twice as much work as others for the same money; some men are engaged by the day, some by the month, and some by the year, the wages varying very materially in each case.

In the different classes of soils there is not so much variation. For instance, in a clay soil the drains are not usually so deep as in a lighter soil, so that digging stiff ground 3 feet deep would cost about the same as digging a looser ground say 3½ feet deep. So it is also with reference to distances apart; deep drains at wide intervals would cost about the same amount of work as shallow drains at closer intervals. But the labor of filling up the ditches and the cost of the tiles would vary somewhat, and there would be a saving of tiles in favor of the less compact soils and deeper drains, making the cost per acre less, although the cost per rod might be the same as in the stiffer soils. If the proper draining tools are used, making the bottom of the ditch no wider than the thickness of the tile, the cost will be less in all soils. When the cost of filling threatens to be great, it is a good plan to use a team and scraper, working the horses on one side of the ditch and the scraper on the other side.

Let us suppose that the man is hired by the month, which will make the cost a medium between a daily and a yearly engagement. Let him get $18 per month, and add $10 for board; total $28. So long as in-door employment can be reserved for rainy days, no change in this amount need be made on account of wet weather. Under favorable circumstances, the soil not being too stony or too wet, a ditcher should dig about eight rods per day, but let us count the average six rods. This will make the cost of cutting 18 cents per rod. Laying the tile and filling the drain will cost about 6 cents per rod. The following are the lowest prices for which tiles can be manufactured and sold at a reasonable profit:

2½ inch tile	.. ..	$ 9 00	per thousand
3 "	"	10 00	" "
4 "	"	15 00	" "
5 "	"	25 00	" "
6 "	"	35 00	" "

Taking 3-inch tile as the average size used, the cost of tile per rod will be say 16 cents, leaving some allowance for breakages. These figures make a total of 40 cents per rod. This may be regarded as near the minimum cost. Let us now endeavor to arrive at the cost per acre. Let us suppose that the soil is a loam, the distance of the drains apart being say 75 feet. There are 160 square rods, or 43,560 square feet, in an acre, so that if the ditch will drain 75 feet wide, the length will have to be 581 feet, or the equivalent of this number of feet if there is more than one drain. This number of feet is equal to 35 rods, which, at 40 cents a rod, will amount to $14—the cost of draining an acre.

There are other items of cost which we cannot include in this computation. We have made no allowance for hauling the tile, this cost being so variable in different localities. If the farmer can do the hauling in the winter, when himself and the team would otherwise be idle, the cost would not be much. We have also made no allowance for skilled labor; for, as we have already pointed out, the leveling should be skilfully done by the farmer himself, in which case no skilled labor will be required. The cost of leveling, mapping out, etc., must therefore also be added to the above bill. No farmer should be far astray in computing $20 to $25, including all contingencies, as the cost per acre for draining his land, and extreme cases should scarcely exceed $30. By the use of ditching machines, this cost can be considerably reduced.

By thorough under drainage, a large percentage of our farms would increase their productions at least 10 bushels of wheat per acre, or the equivalent thereof in other crops, so that it will now be seen that drainage will pay its cost in about two years, and instances are known in which the cost has been returned in one year; yet it is well known that a drain does not begin to return its highest dividends for several years after its completion.