get enough manure. It is a fact that on the best managed farms, speaking in a general way, the soil is becoming depleted of plant food, and the bounteous harvests of grain with an abundance of straw are not now reaped. How to provide this plant food in abundance is a difficult question to deal with. To use artificial manures (only in exceptional cases) is out of the question. Many of us have paid dearly before we got that fact fixed in our minds. On the farm is the proper place to make manure. There are men in Ontario who have in a large measure solved the problem, and D. M McPherson, M. P. P., of Lancaster, is one of them. We may not see eye to eye with him in all matters bearing on farming, but he is doing a splendid work as an educator. There are some good object lessons to be seen on that farm.

[NOTE.—We invite and will gladly publish additional correspondence embodying the experience of practical men on the above questions. One reader can benefit another in this way and lose nothing himself, but rather gain. Does your experience confirm what these men state, or does it differ, and in what respect? Do you question any of their statements; or wherein do you prefer the plan you pursue? Let us hear from you.—EDITOR]

How to Enrich an Impoverished Farm,

OR TO PRESERVE THE FERTILITY OF A FARM NOT IMPOVERISHED.

[From a Farmers' Institute address by Joseph Yuill, Carleton Place, Ont.]

If a man became possessed of an impoverished farm, either by bequest or for a bad debt, it would be all right for him to make the best he could of it, but land is so cheap and plentiful nowadays that it would never pay to purchase an impoverished farm.

Treat one field at a time in the following manner: Sow buckwheat, as early in spring as the danger of spring frost is over, at the rate of two or two and a half bushels per acre. (If it would not grow buckwheat I would not know what to do with it.) When the buckwheat is in full bloom plow it down and sow again with buckwheat, using two or two and a half bushels per acre; when at the blooming stage plow under. If any manure is to be had, spread it on the surface in autumn, winter or spring. Sow barley early in spring and seed down, using twelve pounds early red clover seed per acre. I would emphasize this point: Do not allow the young clover to be grazed off, especially by sheep, as they graze so closely. If you succeed in growing clover you have won the battle.

Before winter, run the mower over the field, which will cut the clover and long stubbles, which will drop to the ground and protect the young clover. This will make a splendid mulch to protect the young clover, and the stubble will not rake up in next year's crop of hay. The chances are you will have a splendid crop of clover; cut when it is in full bloom—not a brown head to be seen in the field.

The second crop can be saved for winter feed, or it can be grazed off or plowed under, but in any case the field should be plowed that autumn. Sow peas next spring. After the peas are harvested, and so late that the clover will not germinate, plow the ground. (Clover seed requires a temperature of 60° to germinate). This will turn up the clover sod which was turned down the year before and which is full of clover seed. Sow with oats or any other grain desired the next spring, as I do not approve of growing wheat in Ontario now. Seed again with clover. If the clover sod which has been turned up has considerable clover seed in it, five pounds of seed per acre will be sufficient After the oats are harvested, proceed as on the former occasion. Run the mower over the field and do not allow it to be grazed off. Take off the first crop of clover, plow the second crop under. This will make the most beautiful seed bed imaginable for any kind of grain and also for corn or roots. If corn or roots are grown and properly cultivated, a great part of the clover seed will germinate and be killed. As soon as the corn or roots, as the case may be, are harvested, plow the ground. Seed down next spring, using twelve pounds clover seed, and go through the same rotation as already described; that is, grow clover one year and grain two years. I consider clover is the most valuable plant to the farmer that grows in Canada.

Clover has the power of gathering free nitrogen from the air, and being a deep-rooted plant it has the power of penetrating the soil and bringing up the fertility from the subsoil to the surface, where it is available for plant food. If two crops of hay are wanted, seed down with eight pounds early red clover seed, four pounds timothy seed, and two pounds alsike. Mow for two years, but in no case allow the field to remain more than two years in hay. There is no better way of eradicating Canada thistles and several other kinds of noxious weeds than by growing clover very thickly and two crops the same season. Of course, it is expected that all the available manure is properly saved and applied in the green state to the surface.

I have not one word to say against artificial manures, but the farmer should not allow one particle of solids nor one drop of liquid manure to be lost, and liquid manure is worth far more than most farmers think. The liquid manure of the horse is worth three times as much as the solids; the liquid manure of the cow is worth twice as much as the solids; the liquid manure of the hog is worth once and a half as much as the solids; the liquid manure of the sheep is worth as much as the solids; hen manure is very valuable, and should be mixed with the other manure before being applied. Wood ashes are a very valuable manure, and should be applied to corn or potatoes or to the orchard.

Do not allow manure to heat, as nearly one half the strength of manure is lost in the process of heating. A deep-rooted crop should always be followed by a shallow-growing crop, and a nitrogen-gathering crop should be followed by a nitrogen-consuming crop.

If the above instructions are carried out, an impoverished farm can be made fertile in a very short space of time. I purchased a farm a few years ago, so impoverished that it would not grow a decent thistle, and have treated it in this way, and now it is one of the most fertile farms in this part of the country.

The Farmer's Gold Mine.

BY PROF. H. E. VAN DEMAN.

The farm has often been compared to a gold mine, and very properly too, but a gold mine is worth just so much less for each dollar's worth of ore that is taken out of it. The same is nearly as true of the farmer's gold mine. Every crop, every animal, every pound of butter, and every dozen of eggs that leave the farm rob it of just so much of its fertility as they contain. And what is this fertility? Where does it come from, and how can we replace it? These are questions which we should all understand fully and be able to answer them by actual demonstration. With the exception of lime, iron, and a few other elements that are usually in superabundance in the soil of most farms, they are *nitrogen*, *potash*, and *phosphoric acid*. All of these are absolutely indispensable to the growing of every crop and to the existence of every living thing, whether animal or vegetable. Nature is generous and has furnished a large supply of them within our reach, but we must know where they are, when we need them, and how to get them most cheaply.

Nitrogen is far the most costly, and yet it is the most abundant, as four-fifths of the air is composed of it, but in its common and gaseous form, which is beyond our reach, except through the clovers, peas, and other pod-bearing plants that have the peculiar ability to gather and store it in their structures. The bodies of animals contain it in the form of ammonia chiefly, and all their excrements are more or less rich in it. Combined with certain minerals, it is found as nitrate of soda, etc.

Potash is found in almost every arable soil in fair proportions, but not always in abundance, nor in the most available condition. If one of the three things named is more important than another, it is potash, for it seems to be the backbone of all manures, whether homemade or commercial. Frequent stirring of the soil helps to liberate that which is locked in the mineral particles of the earth. That is one of the ways of extracting the gold from the ores of the farmer's gold mine. The ashes of trees and all other vegetable matter contain potash. But the great mines of Germany contain the most condensed and available supplies of it so far discovered.

Phosphoric acid is also found in the soil, in the bones of animals, in the phosphate quarries, and in wood ashes. Cultivation will unlock the combinations in which nature has secured it, but not often so easily or completely as we would desire. In order to get the wealth from the mines upon the farm we must in many cases resort to outside help. We must grow the clovers, cow peas, etc., to get from the air what nitrogen is possible. We must make and save all the animal manures that can be produced at home. When outside aid is called in by the purchase of chemical or commercial manures, then the cheapest sources are the muriate and sulphate of potash, and kainit, for potash; and dissolved bone, bone-black, and dissolved phosphate rock, for phosphoric acid. These, and slaughter-house refuse of various kinds for nitrogen, will enable the gold-miner on the farm to get out the shining particles, with here and there a solid nugget, in the shape of good crops. Then, if these crops are fed on the farm, and only dairy products and fat stock sold instead of grain, with fruits and vegetables (which are mostly water), the fertility may be kept up indefinitely. Thus, instead of the farm mine becoming exhausted, it may, with good management, return profitable yearly dividends, and become richer as the years go on.

No Equal in the Dominion.

The *Montreal Witness*, one of the oldest, most impartial and influential newspapers in Canada, says: "The FARMER'S ADVOCATE, published by the Wm. Weld Company, London, Ont., and Winnipeg, Man., has for more than a score of years been the leading agricultural paper published in the Dominion. Judging by the recent improvements effected in that journal, the ADVOCATE will soon rival the oldest and best agricultural papers of the United States. The Christmas number of the FARMER'S ADVOCATE is very tasteful gotten up, the beautiful tricolored cover being a work of art creditable to the publishers."

MRS. ACHESON, of Cartwright, called to acknowledge receipt of Bible sent her as a premium, and to say she was much pleased with it. Certainly in her opinion any one taking the trouble to solicit the names were fully repaid by securing such a valuable premium.

DAIRY.

Milk-Fat and Cheese Yield.

To the Editor FARMER'S ADVOCATE:

SIR,—In the ADVOCATE of Jan. 1st, page 9, you were kind enough to give a summary of Bulletin No. 110 from the N. Y. Agricultural Experiment Station (Geneva). We in Canada are always pleased to learn from our American neighbors or from anyone. We recognize the good work being done by our American neighbors. They have many learned and able men in connection with these stations. The New York Station has been particularly fortunate in the selection of men to preside over her departments. True, some of her best men have not always remained with her, but have sought renown in other fields, leaving the way open at fair Geneva for others. Some statements in Bulletins 68 and 110, however, are rather inconsistent. We all are familiar with the proverb, "Consistency, thou art . . . ," but possibly this proverb has not yet reached the sanctum of the author of the bulletins on this question of milk-fat, casein, and cheese yield.

Lest Canadian readers should not be aware of these inconsistencies, will you allow me space to call attention to a few of them?

1. In Bulletin No. 68 (new series), twice on page 211 and again on page 213 the writer tells us "there were two-thirds of one pound of casein for each pound of fat in the milk," and each time it is placed in italics in order that readers shall not miss the point. On pages 212 and 213 the statement is repeated in different words: "For all practical purposes the results may be regarded as showing uniformity in the relation of fat to casein in factory milk from different herds."

Compare these statements with the latter part of conclusion two in Bulletin No. 110: "The amount of casein for one pound of milk-fat decreases about one-tenth of a pound, from 0.70 to 0.60 pound, when the fat in milk increases one pound." It strikes me that these two conclusions are somewhat inconsistent, and it will be in order for the author to harmonize them or else tell us which one is wrong and which correct.

2. On page 215 of Bulletin No. 68 we find: "Thus far we have considered the two objections that have been raised to show that fat in milk cannot be an accurate guide in regard to the amount of cheese that can be made from milk. These objections were (1st) that milk rich in fat contains less casein in proportion to its fat than does milk poorer in fat, and, hence, milk rich in fat makes less cheese for each pound of fat than does milk poorer in fat; (2nd) that the loss of fat is very much greater in cheesemaking in case of milk rich in fat than in case of milk poor in fat. In reply to these objections, which are not based upon the results of careful, long-continued investigations, we have shown that the results of our investigations all go to show that the above objections or claims are not based upon actual facts and are more or less completely false." Bulletin No. 110, referred to, proves that objection "1st" is all right, and if the writer of the foregoing is not yet convinced of the soundness of objection "2nd" we can furnish plenty of evidence to prove it at the Guelph Station.

3. Bulletin No. 68, page 216, says: "There should, as a rule, be made from each pound of fat in milk about 2.7 lbs. of green cheese, whether we use milk poor or rich in fat."

Bulletin No. 110 says: "As a rule, when milk-fat increases the amount of cheese made for each pound of milk-fat decreases. In milk containing 3 per cent. of fat, 2.85 pounds of cheese are made for each pound of milk-fat, while in milk containing 4 per cent. of fat, 2.60 pounds of cheese are made for each pound of fat."

This latter conclusion is closely in accord with the results at the Guelph Station.

4. Bulletin No. 68, page 218, says: "It is important that the reason be made clear why milk richer in fat makes more cheese than milk poorer in fat. The richer milk furnishes more fat and more casein for the cheese; the more fat and casein we have the more water and ash we can retain. Hence, the increased yield of cheese comes, primarily, from the increased amount of fat and casein, and, secondarily, from the added amount of water these can retain." (In this statement we have a mixture of Canadian theory and New York practice.)

Bulletin No. 110 answers the same question in a slightly different manner. Conclusion 4 reads: "Why is the cheese yield greater for a pound of fat in poor milk than in richer milk? What makes the cheese yield . . . , etc.? The increased yield of 0 25 pounds comes from casein and water."

In 1894 the increased yield of cheese from *richer* milk was due to the extra fat, casein, and water. In 1895 the increased yield of cheese from a pound of fat in the *poorer* milk is due to the extra casein and water. We would like these statements harmonized.

These are all the inconsistencies we shall speak of at present, but would like to refer to two other points.

1. "The skim-milk difference" may have terrors for the New York dairymen, but it is a poor sort of a bugaboo to hold up to frighten Canadian dairymen, as we do not know what it means and we do not wish to know. After all, this talk about