

amount of plant food and its character. We learn therefrom in what essential constituents it is rich, and what elements it is necessary to add to supply deficiencies. Having in our possession data regarding temperature, rainfall, &c., we may use chemical and physical results that have been carefully obtained, to predict the probable fertility of the soil. We can also foretell, in a degree, the suitability of those soils for various farm crops. It would take up too much time on the present occasion to review the work done during the past year in this branch of our investigations, but I should like to say that we are gradually accumulating some very valuable data which will be of use, not only to our own people here, but, I am convinced, will be of great service for immigration purposes in European countries.

I trust that some time in the future we may be able to construct, for certain large areas of Canadian territory, soil maps—maps similar in principle of construction to those that are prepared as weather maps. Such maps would outline more or less accurately, the general character and fertility of the soil of the various areas in Canada. This work, of course, could not be carried out entirely from laboratory data, but would have to be supplemented by an examination of the various soils *in situ*. I mention this matter to show the possibility of a more extended and permanent usefulness in the future, in connection with the examination of virgin soils.

The soils which we have examined comprise specimens from all parts of the Dominion, from every province. Our results show that we possess in Canada soils which compare most favourably in richness of plant food with the best and most fertile soils of other countries. Concerning much of the prairie soil in Manitoba and the North-west Territories, as well as those alluvial soils which have been formed as river deltas and tidal deposits, both on the Pacific and the Atlantic coasts, it is scarcely possible for me to speak in terms of exaggeration, because they possess such a vast store of plant food, a large portion of which is assimilable and ready to be used by crops. With regard to the other provinces, we have analysed many soils which have shown themselves to be excellent. A detailed account of the analytical results in this work, as well as deductions drawn therefrom, will be found in my report for the year.

FODDER GRASSES.

It will now be necessary for me to proceed to the second subject of my branch of research work, namely, the examination of cattle fodders. In fodders, the most important work of the past year has been the preparation of bulletin No. 19, which was issued in September last. It contains a botanical and an agricultural account of many of our native and imported varieties of grasses. It contains, as well, a statement of the chemical composition, and deductions therefrom, as to the relative value of these grasses for feeding purposes. This bulletin is the result of the joint labours of Mr. Fletcher, the botanist of the experimental farm, and myself. The grasses, whose analyses appear in this bulletin, were grown either at our own farm here, in Manitoba or in the North-west Territories. We have, therefore, the composition of the grasses grown under various conditions of climate and on different soils. I should also add that many of the grasses examined were cut and analysed at two stages of growth. This was to ascertain the best period at which they should be cut for making into hay. In this bulletin, a farmer can find an account of all the more common grasses, some of which are illustrated. There were ninety-two in all examined, and the dairymen and stockraisers will here obtain much useful information regarding the general character and suitability of our grasses, either for pasture or for meadow purposes. The figures given show their composition, and, consequently, their relative food value. One of the most important deductions which we were able to make from this work, is in regard to the deterioration which takes place in the food value of grasses as they ripen their seed.

The analyses of these grasses show that the best practice would be to cut the grasses while in bloom, or shortly after, if we wish to preserve the greatest amount of the most valuable of the food constituents, viz., the flesh-formers or albuminoids. Shortly after the time of bloom, the fibre of the grass becomes woody and less digestible; so that there are two important reasons why timothy and other grasses