

of the ground. In proportion to the preponderance of any one of these three substances, a soil is said to be light, stiff or calcareous.

It is of importance to observe, that by a clay soil is not meant a *pure* clay, since no such soils occur in nature. Even the *porcelain clays*, which are the richest in alumina, and occur merely in small patches, contain only from 42 to 48 per cent. of that earth; the remainder consisting of silica. Soils containing 25 or 30 per cent. of alumina, are found generally too heavy for profitable cultivation, and are best adapted to the purposes of pasturage. It may be further observed, that soils contain the three substances above mentioned, in a state of *mechanical mixture*. With silica and lime, this is always the case, but in the clays, which principally consist of silica and alumina, these materials are united by *chemical combination*. On a knowledge of these proportions, the following classification and nomenclature are founded, as given by Professor Johnston. We have had frequent opportunities of testing the advantages and correctness of this arrangement for practical purposes.

1. *Pure clay* (pipe-clay) is composed of about 60 of silica and 40 of alumina and oxide of iron, chiefly in a state of chemical combination. Such soils rarely occur but in small patches, and are wholly unfit for agricultural purposes.

2. *Strongest clay soil*, consists of pure clay mixed with 5 to 20 per cent. of a siliceous sand, which readily separates by boiling and decantation. This soil is of a very unctuous nature, exceedingly stubborn, and affords a good material for making tiles.

3. A *clay loam* contains from 30 to 40 per cent. of fine sand, which may be separated by washing. This admixture renders such a soil more open and friable, and consequently more easily cultivated. When from 40 to 70 per cent. of sand can be separated by mechanical washing, it is called a *loamy soil*; from 70 to 90 per cent. of sand, it is termed a *sandy loam*; and when no more than 10 per cent. of pure clay remains, it is considered a *sandy soil*.

"The mode of examining, with the view of naming soils as above, is very simple. It is only necessary to spread a weighed quantity of the soil in a thin layer upon writing-paper, and to dry it for an hour or two in an oven or upon a hot plate, the heat of which is not sufficient to discolour the paper—the loss of weight gives the water it contained. While this is drying, a second weighed portion may be boiled or otherwise thoroughly incorporated with water, and the whole then poured into a vessel, in which the heavy sandy parts are allowed to subside until the fine clay is beginning to settle also. This point must be carefully watched, the liquid then poured off, the sand collected, dried as before upon paper, and again weighed. This weight is the quantity of sand in the known weight of *moist* soil,

which by the previous experiment has been found to contain a certain quantity of water."

Hitherto we have considered only the clay and sand contained in a soil, while lime is found more or less in all soils, that will pay for cultivation—hence we have

4. *Marly soils*, which when dried are found to contain from 5 to 20 per cent. of lime. The mechanical properties of the marl depend upon the relative amount of silica and alumina it contains. Hence we have a sandy, loamy or clay marl. The value of marl as a fertilizer, does not wholly depend on its percentage of lime; if it abounds in alumina, it would be beneficial on a loose sandy soil, independent of the lime as a mere *mechanical mixture*; while sandy marl would in the same manner be serviceable to heavy clays.

5. *Calcareous soils* are so denominated in consequence of having upwards of 20 per cent. of lime. When they contain a sufficient amount of clay to render them what is technically called "good holding land," they constitute the best soils for most agricultural purposes. Professor Johnston gives the following simple directions for determining the amount of lime in a soil, when it exceeds 5 per cent:

"To 100 grains of the *dry* soil diffused through half a pint of cold water, add half a wine glass full of muriatic acid (spirit of salt), stir it occasionally during the day, and let it stand over night to settle. Pour off the clear liquor in the morning, and fill up the vessel with water, to wash away the excess of acid. When the water is again clear pour it off, dry the soil and weigh it; the loss will amount generally to about one per cent. more than the quantity of lime present. The result will be sufficiently near, however, for the purposes of classification. If the loss exceed 5 grains from 100 of the dry soil, it may be classed among the marls, if more than 20 grains, among the calcareous soils."

6. *Vegetable moulds*, which vary much in their texture and composition—from the rich garden mould, containing 8 to 12 per cent. of organic matter, to the peaty soils, having 58 to 70 per cent. together with very different proportions of clay and sand. To determine the amount of vegetable matter in these soils, for the purposes of classification, is a very simple process. First dry the soil in an oven, and weigh it; then heat it gradually to a dull redness over a lamp or fire, till all the combustible matter is consumed. Again weigh it; the loss will be the amount of organic matter.

SHORT-HORNS IN CANADA.

We have been favored with the particulars of weight, &c., of the Hon. Adam Fergusson's splendid short-horn heifer, *Blossom*, which was purchased and slaughtered last Christmas, by Mr. Philip Armstrong of this city. It will be recollected by seve-