all the voidings. He went farther; got the consent of the neighbors and the villagers near by to use muck in their pens for the manure. In this way he secured enough manure to fertilize nearly one-third of his land the first year. On this he raised corn, potatoes and oats, and had a satisfactory yield. Some of this land he seeded down. Increasing his stock, the next year he wade more manure, and extended the enrichment to two-thirds of the farm. I was particularly struck with a heavy growth of buckwheat on a knoll that had been absolutely barren—a field of mere sand.

His practice was to apply the manure after the land was plowed, harrow it in, and sow his grain. By using muck in the stables, he secured all the liquid as well as the solid voidings, and the mechanical improvement of the land by the muck was of almost equal importance, making a brown mellow soil of it, completely changing its character. The effect of the manure (a good coat was given) continued during the second year, when the land was plowed very shallow, so as not to bury the surface soil-the muck of which, now humus, seemed to hold us fertility well, save what was removed by the crop; it also promoted moisture. When this treatment is extended over all the land, there will be no difficulty in keeping up the condition of the farm. Green manuring can now be made an aid in enriching the land. In addition, a good proportion of the crops fed on the farm will help sustain its fertility. Hogs are good manure-makers, as this case has shown. The owner said " I care not for any profit on the hogs; I expect none. What I want is the manure." He was not then aware of the benefit of the muck, but he learned it afterward. Fort Plain. N. Y. FROM THE COUNTRY GENTLEMAN.

GROUND LIMESTONE.

Professor S W. Johnson.

GROUND limestone has been much talked of lately as a tertilizer What is 't and what is it good for applied to land ?

The purest limestones are principally or entirely carbonate | of lime or, as chemists now more commonly term it, calcium carbonate. This substance is agriculturally important because no crop can develop in the absence of a calcium, (lime) compound and because calcium carbonate is to vegetation a most common and appropriate source of this substance. One hundred pounds of pure carbonate of lime contain 56 pounds of lime and 44 pounds of carbonic acid. A good yield of 30 to 45 bushels of the ordinary grain crops, straw included, annually withdraws from the land about 10 pounds of lime. One-and a half long ton of hay takes away 30 pounds and two long tons of Red Clover, 85 pounds. Our other crops mostly stand between these extremes, and with the exception of ni-trogen and potash, no other ingredients are commonly demanded of the soil in greater quantity. It is therefore evident enough that were lime as scarce and as costly to provide as are nitrogen and potash, any means of supplying the former would rank in importance with the materials which yield the latter substance.

Fertile soils always contain a supply of lime in some shape or other, but poor soils are often deficient in this element of productiveness, and soils once fertile may in the course of time be so far exhausted of lime as to require some applications that will restore it.

Lime may exist in soils in the states of carbonate, silicate, humate, and phosphate. The last-named compound is generally very small in amount. The silicates which contain lime

are quite numerous; most common minerals of the granitic and slaty rocks are compounds of this sort. As these break down under the processes of weathering their lime becomes. carbonate, or in presence of humus (decayed vegetable matter) humate. Carbonate of lime is not altogether insoluble. Ono pound of it dissolves in about 50,000 pounds of pure water. In water containing carbonic acid it dissolves much more abundantly up to one part in 1,500. When vegetable or animal matters undergo decay in the soil their nitrogen becomes nitrio acid which unites with the lime and the resulting calcium nitrate dissolves with great ease. In most good soils sulphate of lime is constantly dissolving in the rain water, 500 j rts of which can take up one part of sulphate. Thus it happens that between the crops which are harvested off the land, and the water which drains through and ruis away into the streams a slow but constant removal of lime from the soil is going on.

This waste of lime from the soil may be appreciated and roughly measured by the quality of the spring and well waters. In Lewis County and Jefferson County, N. Y., the Black River flows in a valley that lies nearly along the line of junction of the granitic rocks and soils on the east and north, and of limestone ledges and land to the west and south. The granite region is mostly one of Pine and Spruce timber, with a sandy, light soil and pure, soft water. The limestone country was formerly covered with a heavy growth of hard-wood, has a deep, rich, loamy or clayey soil, and water so hard that it quickly "furs" a tea-kettle and cannot well be used for washing with soap, on account of the carbonate and sulphate of lime which it holds in colution.

When such removal of lime reaches a certain point, the fertility of the land is impaired, and then restoration of the lime is essential to renew the productiveness. On such a soil finely ground limestone acts like magic, and a ton or two of it "renovates" the land for 10 or 20 years, provided, of course, that other def. racies have not occurred or have been remedied by the usual manurings and amendments. If the limestone is one of the impurer sorts, containing magnesia, sulphates, phosphates, etc., its application may make good a wider range of deficiencies and be more beneficial than were it simply carbonate of lime. On the other hand, ground limestone on soils already containing an abundance of lime would be of no use whatever—like carrying coals to Newcastle.

It may, however, happen that soil underlaid at a few feet depth by limestone, is superficially wanting in calcium compounds. I have known instances where an application mostly consisting of carborate of lime, has worked admirably on such land. In Great Britain where "liming has long been practiced, it is well understood that the lime "sinks" and this evidently takes place in part by solution.

Ground limestone is not altogether the same in its effects on the land and orop as alaked lime. The latter is a powerful chemical agent and may be useful where carbonate of lime is already abundant, by its influence on the texture of the carth or by its solvent action on the stores of plant food that are present but unavailable in many soils. Slaked lime, after long exposure to air, takes up carbonic-acid gas and then is a carbonate quite similar chemically to ground limestone, but vastly more perfect in pulverization.

When ground limestone is applied where the need of it has been urgent it is at once highly appreciated, and farmers who enjoy its benefit are likely to conclude that it must be generally efficacious. Others find it totally without action on their land or crops. From this opposition of experience arises a controversy which is carried on with more zeal than discretion, and can only be set at rest by an understanding of the reasons of its benefit or failure.

⁽¹⁾ No one dreams of denying the value of muck as an absorbent. A well known farmer in Sussex, Eng., kept a constant stock of 500 fatting pigs, fed on purchased food, as a means of manuring his almost barren down-land A. E. J. F.