in the form of coprolites in the green-sand formation, in Estremadura, Spain; in the Carolines, U. S.; and, richest of all, the *apatite* of Canada, which often contains 82 °/$_o$ of phosphate nearly 40 °/$_o$ of phosphoric acid, but which, being in the crystalline form, is useless until it has been ground and dissolved in sulphuric acid (1)

Many of the richest of the French phosphate-rocks contain as much as 30 °/$_o$ of phosphoric acid, which though more lasting in its effects is not so easily assimilable by plants as the manufactured article, superphosphate; good samples of this contain from 9 °/$_o$ to 16 °/$_o$ of phosphoric acid, soluble in water, and one or two per cent of what is called *reverted* phosphoric acid, i. e., acid that has returned to its original state.

Besides these, there is the *precipitated* phosphate; this has undergone a chemical preparation, it contains from 35 °/$_o$ to 50 °/$_o$ of phosphoric acid, the assimilability of which is half-way between the acid in raw phosphate and that in superphosphate

Lastly, beside these animal and mineral phosphates, we have the *phosphatic slag* of the steel furnaces, which contain from 11 °/$_o$ to 18 °/$_o$ of phosphoric acid, almost as assimilable as the acid of superphosphate if the land to which it is applied be rich in humus or vegetable matter, besides a great percentage of caustic lime, which makes it valuable for land that is poor in that substance

POTASH.

Of this, commerce supplies the farmer with the following forms:

Chloride of potash.	50 °/$_o$ of potash,
Nitrate of potash	1? °/$_o$ of nitrogen and 45 °/$_o$ of potash.
Sulphate of potash,	42 °/$_o$ to 58 °/$_o$ of potash,
Kainit	23 °/$_o$ of potash.

Potash is very useful on calcareous soils, which are generally poor in this stuff but granitic and clay soils are full of it.

LIME.

The utility, almost the necessity, of liming land particularly granitic soils is known to every one (*in Europe. Ed.*) We shall not at present dilate on this In the mixed chemical manures, *plaster*, or sulphate of lime is the form in which lime is usually employed.

Unburnt plaster contain 32 °/$_o$ of lime.

Burnt plaster contains 41 °/$_o$ of it.

IRON AND MAGNESIA.

Iron is only required on white soils (*terres blanches*). On a great many crops the application of green-vitriol —*sulphate of iron*—in powder has proved a great benefit.

Magnesia, especially on calcareous soils, has recently been recommended. It is used in the form of *sulphate*, or rather as burnt dolomite. *Dolomite* is a rock like limestone, only in it magnesia replaces lime. There are mines of it in the Pas-de-Calais, and in Sâone-et Loire. (Some magnificent rocks of it in the North of Italy. Ed.)

If kainit — metallic potash — be used as the form of potash, plenty of magnesia will be found in it.

THE PURCHASE OF CHEMICAL MANURES.

As the composition of chemical manures varies, as their contents of the useful elements differ, their market-price varies in accordance with the quantity of these they contain and with their degree of assimilability.

(1) We were sorry to hear yesterday that the Florida phosphate is arresting the apatite mining in Canada Ed.

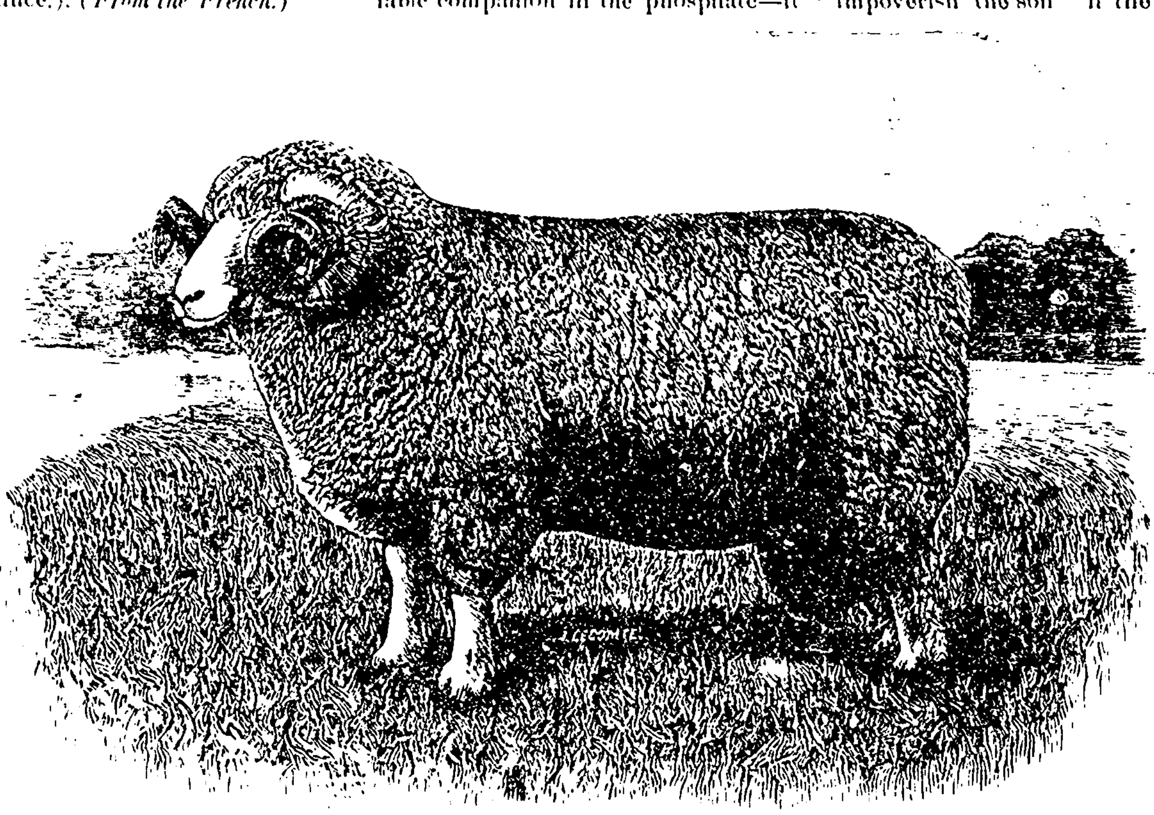
Thus, sulphate of ammonia, which contains 20 °/$_o$ to 21 °/$_o$ of nitrogen, is of course sold at a higher price than nitrate of soda, which only contains 15½ °/$_o$.

The phosphoric acid of superphosphate being more soluble than that of natural phosphates, is also higher priced.

Chemical manures, then, are not sold simply by weight, but by the *unit*, that is, by the pound of the useful element they contain.

Thus (*to cut a long story short Ed*), sulphate of ammonia contains, say, 20 °/$_o$ of nitrogen, the price in England to-day of nitrogen is 12 cents a pound; therefore 20 × 12 = $2 40 the 100 lbs. or $48.00 a ton of 2,000 lbs. Here, in Montreal, nitrate of soda is sold at $3 00 a 100 lbs Supposing it is guaranteed to contain 15 °/$_o$ of nitrogen, what is the cost of that element a pound? 300 divided by 15 = 20 : therefore the cost is 20 cents a pound.

(Here, follows in the original, a list of prices of manures in France; this we think it hardly worth while to reproduce.). (*From the French.*)



DORSET HORN RAM.—Bred by Mr Thomas Chick, Stratton, Dorchester.

LIME.

Chemically speaking, limestone is a *salt*, resulting from the combination of lime with carbonic acid, and chemists, therefore, call it *carbonate of lime* In the kiln, limestone decomposes, the gas, carbonic acid, is driven off by the heat, and *quick lime*, remains. This is very greedy of moisture, and, combining with water, falls into powder, becoming *hydrated* or *slaked* lime In this form it is applied to the land, either alone, mixed with earth, or made into compost.

In farming, fat (*grasse*) lime should be preferred.

Lime possesses qualities very different, both physically and chemically, from the carbonate of lime whence it is derived. While the carbonate is slow in action and insoluble in pure water, lime is soluble in water, though in a trifling quantity, and is a powerful agent of decomposition.

In arable soil, lime plays a very complex part. All plants absorb it as a food, for it is found in the ashes of all vegetation. Thus, 1,000 lbs. of the following products, when *air-dried*, contain the annexed quantities of lime:

Clover, 20 lbs.; hay, 8 lbs.; pease, 12 lbs., vegetables and grain, quantities varying from 0.2 to 1 lb. These figures vary a little, but will serve to give a general idea of the subject.

Clover absorbs quantities relatively considerable It was proved long ago that lime, and all manures that contain it in large proportions, such as plaster (sulphate of lime) favour its growth, and that it is particularly fond of a good calcareous-clay soil with a deep subsoil

But the effect of lime is most sensibly displayed in its chemical action. It hastens the decomposition of animal, vegetable and mineral matters Organic nitrogen is transformed by it into nitrates which are directly assimilable by plants; or, in other words, it favours nitrification, provided the soil contains humus, is permeable to the air, and is free from excess of moisture. It attacks and facilitates the decomposition of several mineral compounds. By forcing it to separate from its combinations, it makes potash soluble; and by disengaging itself from the phosphoric acid—its invariable companion in the phosphate—it places it at the service of plants. In a word, it accelerates the useful action of nutritious matters.

Thus, its chief part is to bring about the circulation of those fertile ingredients of the soil that seem to be *asleep*, and which more or less resist the other agents of decomposition.

A soil analysed by the *chemist* may contain abundance of nitrogen, phosphoric acid, and potash; analysed by the *plants*, it may give results that by no means agree with its theoretical richness. (1) Why? Because these elements are found in combinations whence the plants cannot extract them. Now, lime is one of the most powerful means of compelling the soil to yield up its wealth to the plants that grow on it.

Hence, we conclude that its action is exhaustive, and that if it is applied without consideration and without compensation, the land will be ruined. This is just what the old-time farmer did: hence, the saying, that, "lime enriches the father, and ruins the son." Only, this must not be taken in its strict sense. The same reproach may be addressed to all those heroic means employed by modern agriculture to increase the yield of crops by forcing the land to produce to its utmost power: fallows, rotations, thorough cultivation, drainage, *écobuage*, (?) and even the ploughing in of green-crops. All these expedients aim at the same end as liming; that is, to start into active life the elements of fertility that the soil holds in reserve. The selection of these means is only a question of necessity, of circumstances, of custom, of economy. These all differ according to time and situation.

Every thing, even the best things, may be abused in the world. Lime, well employed, is only an additional aid to intensive cultivation; but, in itself, it is neither more nor less dangerous that the means of which we spoke just now, all of which are intended to increase our crops, and, consequently, to put in circulation the nutritive principles necessary to the well being of plants. All these means are liable to be abused: ploughings as well as liming land Lime will not "impoverish the son" if the law of restitution be observed: to restore to the land what we take from it. What harm can ensue from freeing the nutritive principles which are lying dormant in the soil if we restore, in the form of manure, the riches carried off in the crops? But it is precisely in the economical carrying out of these two conditions that consists the secret of successful farming, at least so far as regards the production of plants.

Lime is in general use in all countries where agriculture is in an improved state. To reach the elevated standard of England and Belgium, in this point, we should have to apply to the soil of this province at least 5,000,000 bushels of lime annually. Liming would certainly be advantageous to three-fourths of our cultivated soils (1)

(1) But if the chemist finds nitrogen, phosphoric acid, and potash in a state of solubility in water! How then? Ed

(1) In the *chalk* districts of England, that form of lime is applied raw to the land at the rate of about 12 or 15 tons to the acre. In Norfolk and Suffolk, large quantities of *marl* are used In the western counties, and in Wales, liming is practised extensively still, though, in S Wales, the farmers nearly ruined their land by it, the consistency of the soil being destroyed by its too frequent use, so that no plant found a firm roothold. The notorious "Rebecca-riots," culminating in the destruction of the turnpike-gates, arose from this: the farmers took their