The Wheat-Chess Question Again.

In our September issue will be found an illustration of a head of wheat from whose base a spikelet of chess protrudes. We stated that Mr. W. Saunders, of this city, one of our most eminent authorities, had examined it, and that he had forwarded it to Prof. Beal, of the Michigan Agricultural College. Meanwhile, however, the annual meeting of the Michigan Horticultural Society was held, to which Mr. Saunders brought the phenomenal specimen. A committee, consisting of distinguished botanists and practical horticulturists, was appointed to examine it more closely, and upon bringing it under the microscope, the stem of the chess spikelet was observed to be caught in the capsule or glutinous envelope of the straw. It was concluded that the stalks of wheat and chess had grown adjacently from the ground, and that while the wheat was still green, the head of chess had in some way become lodged below the ear of wheat, and in growing the wheat had snapped off a spikelet from the chess.

It would be presumptuous on our part to dispute the conclusions of these eminent authorities, but we fear that the question will still remain unsettled in the farmers' minds.

The Value of Straw.

A correspondent in criticising our article on the cost of raising wheat, which appeared in our January issue, says we did not credit the field with the straw. We anticipated this objection, and it gives rise to one of the most practical questions in connection with farming. It is quite in conformity with good book-keeping to debit a field with all the labor and material expended upon it, and credit it with what it produces, so that the field in question should have been credited with the straw as well as the wheat. The wheat, however, produced a fixed amount of money, but what valuation are we to attach to the straw? It may be valued (1) according to its nutritive value; (2) according to its market price; and (3) according to the actual profit which it brings the farmer. In practice the farmer is only concerned in the latter valuation, except in a few instances, in which the farmers live near towns or cities, when the market prices may be applied to the calculation. Now, if the straw brings the farmer a loss instead of a profit, why not debit the field instead of crediting it? In our November issue we pointed out that straw could be fed more cheaply than hay if used with the most concentrated foods, but when fed in the ordinary way it produced a runious loss; and, in many cases, the more straw the farmer has the heavier the loss. If our correspondent will show us one farmer who makes a dollar a ton out of his wheat straw, we will show him ten farmers who lose two dollars a ton.

Many farmers feed straw skillfully enough, and their loss is confined to the manure. Straw has a certain manurial valne, but this is outweighed by the mode of treatment. If they used no straw for litter they would draw their manure directly to the field without being fermented or decomposed; the damage sustained by injuring the mechanical texture of the soil often does more harm than the manurial value does good. Under such circumstances the burning of the straw, although 60 per cent of its manurial value would then be wasted, would result in a final balance in the farmer's favor.

How to Save the Manure.

No. VI

2. The Supply of Phosphoric Acid.—By perusal of our remarks on nitrogen, the farmer will readily perceive when this element is present in the soil; if now phosphoric acid is deficient, the supply of nitrogen will be of little use to the crop. It is not so easy to ascertain the presence or absence of phosphoric acid as the supply of nitrogen. Plants not only contain organic matter, but also mineral or inorganic matter, so that decayed vegetation must contain all the elements of plant food. All the elements of the plant except nitrogen are inorganic. We must also except carbon, but as this element is derived from the atmosphere, not from the soil, we shall omit its consideration. The uitrogenous and carbonaceous compounds are combustible, but the norganic compounds are not, and remain as ashes after being burnt. The inorganic portions of the soil are silica (sand), lime, phosphoric acid, sulphuric acid, potash, soda, iron, magnesia and chlorine. All these must be present in the soil, as well as nitrogen, for no plant can grow if any one of them is absent. We may, however, except soda and chlorine, which unite to form common salt, but these elements are always found in plants, although not absolutely necessary for their development. There is another substance called alumina, forming the chief constituent of clay, which is found in every fertile soil, but it is not taken up by the plant. Of these essential constituents of the plant, as before remarked, all are usually present in the soil in sufficient abundance for plant food except nitrogen, phosphoric acid and potash. Plants are spoken of as living on *food*, but they *drink* to live; they can't eat, so plant food must first be made soluble in water before it can be drunk by the plant.

There are many sources of phosphoric acid, but we shall confine our remarks to those which are readily procurable by our farmers. The chief of these is bones. We cannot treat of phosphoric acid so simply as nitrogen, for it is found combined with other plant foods. It is true that the soda of the nitrate of soda, and the sulphur of sulphate of ammonia are also food for plants, but these fertilizers are only valued for the quantity of nitrogen they contain, and we shall hereafter speak of these elements of plant food which are beneficial on account of the mechanical influence they exercise. Bones, however, although chiefly valued for the percentage of their phosphoric acid, also contain appreciable quantities of nitrogen and potash, as well as other less valuable constituents of the plant. They are almost a complete fertilizer, and are valuable for all crops and soils. Bones contain about 50 per cent of phosphate of lime. This substance is composed of three portions of lime for one of phosphoric acid, and is but slightly soluble in water; but if the bones are ground fine, they gradually become soluble in the soil by the action of rain and of the gelatine of the bone, which contains the nitrogen. This gelatine is the part of the bone from which glue is made, and by fermentation in the soil aids the decomposition of the phosphate of lime. If the bones are steamed or boiled, the organic matter which contains the nitrogen is more or less removed, and the bones then become less valuable. If the bones are burnt a substance called bone ash is obtained, which is valued only for the phosphate of lime it contains.

But bones are frequently sold by the dealers in the form of *superphosphate*. This is the soluble phosphate of lime, made by treating the bones with sulphuric acid. Phosphate of lime being composed of one part phosphoric acid and three parts lime, the sulphuric acid displaces two parts of the lime and substitutes water, sulphate of lime (gypsum) being at the same time formed. All the phosphate of lime is not dissolved by the sulphuric acid, the quantity made soluble being dependent upon the quantity and strength of the sulphuric acid. What is sold as superphosphate therefore contains nitrogen, phosphoric acid and gypsum, but in the true sense of the word, superphosphate means the quantity of phosphate of lime rendered soluble. The farmer's method of making bones soluble by the application of ashes has often been described in the ADVOCATE.

There is another kind of bone phosphate sold in our markets known as *precipitated phosphate*. This is made by adding lime to the superphosphate, by which the phosphate then becomes two parts lime, one part water, and one part phosphoric acid. This is but partially soluble in water, and is therefore intermediate in activity between the three lime phosphate and the superphosphate or one lime phosphate. This fertilizer is very popular.

Now it is well known that phosphate of lime is found in rocks as well as in bones. The deposit sometimes assumes a chrystalline form, and it is then called *apatite*; when not chrystallized it is known as *phosphorite*, the latter being the more soluble. These are also converted into superphosphate by sulphuric acid, and are also extensively used in the ground state. Of all the phosphate rocks that have yet been discovered, the Canadian is the most valuable, containing 75 to 90 per cent. of phosphate of lime; yet, like our ashes and our timber, it is shipped out of our country, as if it were a nuisance, to enrich other nations, and the next generation will rise in their might and call us cursed, when they find that their inherited soil has been robbed of its fertility, and nothing left to enrich it.

The advantage of superphosphate over the other forms of phosphates is that, being soluble, it is readily taken up by the plant, and what remains becomes more thoroughly incorporated with the soil. If there is lime or iron in the soil it almost immediately reverts to its insoluble condition, but it is in such a finely powdered state that it is far more available for the plant than the pulverized phosphate. On this point the ignorance of our farmers is taken advantage of by many dealers. They advise the use of the soluble form because it acts more quickly, so that farmers can see almost immediate results, and become elated over their purchase. They don't seem to observe that such fertilizers hardly wait to finish the growth of the crop which they started so luxuriantly, and the effects cease with the first season. With all respect to active fertilizers, used at the right time and in the right place, if farmers could once appreciate the durability of the more insoluble fertilizers, they would act much more intelligently in the purchase and application of concentrated fertilizers, and the saving would be considerable. The ignorance of the farmer