

way: If you *will* have them in the open air, lay down a bed of ditch-stuff, upon that put about a foot and a half of the dung, &c., which comes from the cattle, and upon that scatter some gypsum; then place another layer of dung, and add more gypsum; then place another layer of dung, and add more gypsum, and so on to the end. Observe not to have it laid too light, for if you do, it will heat, and may take fire. You must not make it too light or too heavy, but just light enough to keep it warm; if it gets too warm, press it well down. You should also have shoots or gutters in your farm-yards to carry off the water. Where this is done I don't care so much about the rain of heaven, because the straw absorbs so much. In this district there are not more than 24 inches of rain in a year. In the north part of Lancashire and at Keswick, there are as many as 57 inches.

Mr. POPE: Manchester is very bad.

Mr. NESBIT: Manchester and London are pretty nearly on a par. In London there are 28 inches and at Manchester about 30.

A MEMBER: how often is it found necessary to clean out the cattle boxes of which you were speaking?

Mr. NESBIT: about once in six weeks. You would be surprised at the condition of the animals when that plan is adopted so different from those which are running about the farm-yard. In fact there is no comparison between them. They were fed upon turnips and linseed, mixed with pea-haulm, &c.

Mr. POPE: Mr. Warnes asserts that he can produce as much meat with six pounds of this mixture on his plan as he could with twelve pounds of oil cake on the ordinary plan.

Mr. NESBIT: If you were to expend as much money as the Duke of Devonshire has upon his conservatory at Chatsworth, I do not think you could much improve on Mr. Warnes' plan of sheds. Perhaps the cattle might be kept a little warmer by having the sheds closed in. If this were done in a manner consistent with ventilation, it would be an improvement, as at present the wind rolls in and cools them; and it would be better to have them kept in an atmosphere of a nice genial temperature. The great defect of Lord Torrington's plan is, that the ventilation is bad; and no system will answer where the ventilation is bad. It is highly important that cattle should be kept in well ventilated buildings. Why, a bullock consumes 79 ounces of charcoal, and destroys 13 hundred cubic feet of air, in a day.

Mr. POPE: I rather think it is better to have one side of the sheds open.

Mr. NESBIT: why you must recollect that if you do not keep the animal warm by artificial means, he will consume a certain part of his food, to keep himself warm, instead of for the purpose of making fat; and it is much better to warm him with a pound of coals, than with a pound of fat, (*hear, hear*).

Mr. DAWB: you were speaking, Mr. Nesbit, of sulphate of lime or gypsum. Now, there is a general impression that where there is a deficiency of that you cannot grow clover, but I have not found that to be the case.

Mr. NESBIT: Wherever you have *hard* water, gypsum is of no use at all—this you may take as a general rule; but where you have not lime in the soil it is of great use.

Mr. DAWB: I think too much importance attaches to the use of gypsum.

Mr. NESBIT: This is a question of some importance. You will recollect that I stated that sulphate of lime acted beneficially by preventing the volatility of ammonia; but it acts directly in supplying one of the mineral constituents of the crops.

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Mr. DAWB: I have found the ashes of burnt wheat very productive. I had a rick of wheat accidentally burnt, and I used the ashes for manure; the consequence was as good a crop as I could have had from guano, (*Hear*).

Mr. NESBIT: Exactly so. Now does not that prove just what I have been saying with regard to manures? viz., the value of the mineral ingredients.

Mr. DAWB: You certainly could not have a better proof of what you have stated.

Mr. NESBIT: By the application to the land of the substances required by the plant, you make it productive. But if you use manure not containing the whole of these substances, you will impoverish the soil. In the burnt wheat you had all you wanted.

A MEMBER asked if there was not sulphuric acid in the ashes of wheat.

Mr. NESBIT: Yes, a small quantity—from 2½ to 4 per cent.

Mr. GRIFFIN: I very much agree with you in what you have said respecting the growth of straw. I have always found that in wet seasons I had a large quantity of straw, and a deficiency of yield in the ear.

Mr. NESBIT: You will always find that to be the case. Wheat only contains 2 per cent. of silica, and the ashes of the straw contain 60 to 70 per cent., and in wet weather this is conveyed very freely from the soil to the plant. Of phosphoric acid the ashes of the wheat contain 45 per cent., and those of the straw only 10 per cent. But the straw weighs a great deal more than the ear. The principal things for the growth of straw are silica and potash. They are derived from the land in great abundance in a wet spring; and the straw growing up rapidly, takes the phosphoric acid which would otherwise have gone into the grain. This happens from the straw being "first in the field;" and when the wheat comes to demand its share, where is it to be got? (*Hear*). When there is this deficiency in the ear, you will often observe that the leaves turn yellow.

Mr. GRIFFIN: I have found that to be the case when I have used saltpetre.

Mr. NESBIT: precisely so. If you use saltpetre you should use guano or a similar manure.

Mr. GRIFFIN: I do not myself think guano a very genial thing.

Mr. NESBIT: Where do you get your guano, pray? Now I am an apostle of agricultural chemistry, and think nothing any trouble which relates thereto. If, when you are about to purchase guano, you will send me a specimen of it, I will analyze it, and let you know its precise qualities without any expense (*cheers*).

Mr. POPE: With regard to deep ploughing, may it not be bad economy in a wet season?

Mr. NESBIT: That is a question, Sir, which I should not like at present to take upon me to decide. Mr. Warrington, of Apothecaries' Hall, took a bitter extract, and filtered it through some animal charcoal or ivory black; and when this solution came through, it had some of the bitter taste left. He then took some sulphate of quinine, and performed the same experiment. The liquid passed out perfectly pure in this instance, as in the former: in fact, the charcoal had retained all the original qualities. He then tried Glauber's salts and Epsom salts, and the result was the same. I therefore think that perhaps the capillary attraction of the earth will retain most of the essential qualities. For instance if you send water through the land with 20 per cent. of salt in it, it may not contain 10 per cent. when it comes out.