

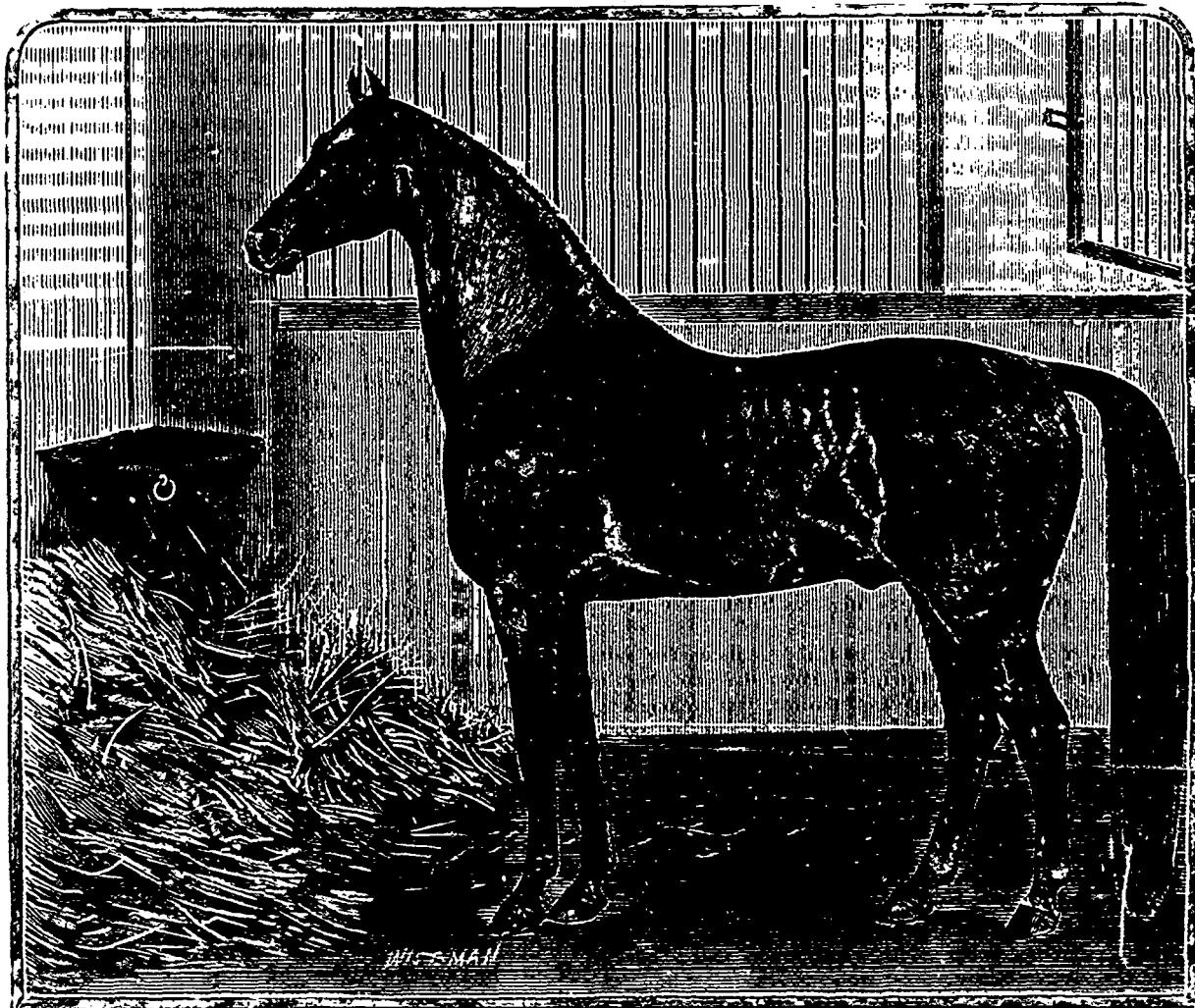
not easy to explain the large reduction in the yield of the plot under experiment, except upon the assumption that the nitric acid proceeds from nitrogen already stored up in the soil in an organic form.

In the *Journal* of the Royal Agricultural Society of 1857 we published a paper upon "The Growth of Wheat on the Lois Weedon System of Cultivation," and in it give the composition of the soil of the fallow plot under experiment: an analysis of the same soil made during the present year shows a very considerable reduction in the nitrogen.

It may be considered as quite certain that an application

important subject. Most of your readers will probably be disposed to agree with me in thinking that further investigation is needed to prove whether the source of the nitrogen of the leguminosæ is to be found in the soil, or whether these plants do in some manner assimilate nitrogen from the air.

I have no complaint whatever to make against Prof. Atwater for the way in which he has commented on our experiments at Rothamsted; though on one important point, to which I am about to refer, he has to a certain extent misunderstood the bearing of our conclusions, when he says: "There are some facts which are very hard to explain without assum-



TROTTING STALLION; ABE DOWNING.

of nitrate of soda, or of salts of ammonia would largely increase the produce of wheat upon the fallow land, I think therefore that we can come to no other conclusion than that the soil, and not the atmosphere, furnishes the nitrogen which grows the fallow wheat crop: and, further, that it is by no means certain whether alternate fallow and wheat is not a more exhausting system of cultivation than that of growing wheat continuously.

#### Sources of Plant Nitrogen.

BY SIR J. B. LAWES, BART., LL. D., F. R. S.

**FRS. COUNTRY GENTLEMAN**—Under the above heading Prof. Atwater has given his views on this interesting and

ing that the plants, especially legumes, obtain nitrogen from the air. Such for instance, are the observations I have already referred to as reported by Messrs. Lawes and Gilbert, and confirmed by Deheran in France, and Schulz-Lupitz in Germany that, after heavy crops of legumes, with their large quantities of nitrogen, had been taken from the soil, the latter contained more nitrogen than it did before the crop grew on it. If the plants took all their nitrogen from the soil, how could the latter have more after it has produced them than it had before?"

What we have established by direct analysis is the fact that after a clover crop has removed three or four times as much nitrogen as a barley crop growing in the same field, the first nine inches of the clover soil will contain the larger amount