

about 33 per cent. of the total nitrogen. The upper section of the plant, including the head and two leaves, had $64\frac{1}{2}$ per cent. of the nitrogen of the plant.

At the third stage of examination, with the grain in the milk, the nitrogen absorbed was found to be 32.0 grs.; the three lower leaves containing 4.789 grs. nitrogen, the lower section of the straw 1.234 grs. and the middle section 2.338 grs.; the two upper leaves, 7.832 grs.; the upper section of the stock, 2.894 grs.; and the head, 12.961 grs. The head then contained $40\frac{1}{2}$ per cent. of the total nitrogen, and with the upper parts of the plant, including two upper leaves and section of stem, 74 per cent.

The ripened plant and grain contained the total of 55.5 grs. nitrogen. The three lower leaves, 2.851 grs.; the lower section of stalk, 1.167 grs.; and the middle section, 2.843 grs. The two upper leaves, 6.384 grs.; the upper portion of stalk, 3.440 grs.; and the ripened head, 38.871 grs. The head then showed about 70 per cent. of the total nitrogen taken from the soil. We thus see that while about 90 per cent. of the total phosphate of the plant is used by the grain, about 30 per cent. of the total nitrogen remains in the straw.

The potash, of course, remains almost wholly in the straw, but a small percentage of it enters into the grain.

T. C. WALLACE.

Fernside, Sept. 29th, 1899.

Commercial Fertilizers

Single or Repeated Experiments ?

To the Editor of FARMING :

In FARMING Aug. 29th, Mr. B. W. Ralston remarks that I have not made it quite clear whether the experiments I referred to were single trials or an extended series. Probably they were a little of both. I think my intention at the time was to show that under certain circumstances—more particularly those circumstances of soil exhaustion which must sooner or later inevitably occur when produce is continuously marketed out of the unaided natural resources of the land—commercial fertilizers were of the utmost importance, and, indeed, an absolute necessity. The various examples I quoted were, I expect, intended rather to illustrate the general question of the advantages that might arise through the assistance of artificial fertilizers, than to act as special lessons to be directly and universally followed.

Single experiments often appear contradictory when compared with others, yes, and not infrequently appear absurd themselves when compared with the proven facts of practical agriculture. But as I have remarked aforetime, these apparent contradictions are but "apparent"; and arise through our not having obtained a grasp of *all* the facts. I entirely agree with Mr. Ralston that trials must be repeated before conclusions can be arrived at; aye, and many times repeated.

Our agricultural professors are, to a great extent, under the necessity of showing direct immediate results, and have to be so continually demonstrating to fresh pupils, that they are apt to acquire a more confirmed habit of prescribing exact manurial recipes for each particular crop than is altogether conducive to the best interests of the practical farmer. In a lecture I delivered to a company of farmers last spring, and which has been widely published, the following remarks occur: "I have formed a very decided opinion that the land may be much more effectively and profitably manured and fertilized on liberal, broad, general principles, than by endeavoring to screw the matter down to the exact manurial requirements of each particular crop. I believe the 'exact' method to be too much the fashion at present, and with the very frequent result of many crops being left without any manure at all; whereas fertilizers at their present low price may be used liberally and profitably in the production of maximum crops, and as fixed

cost of production is the same in a poor crop as in a good one, it follows that any increase of crop beyond cost of manure is so much advantage gained. In producing maximum crops lies our only chance of contending with low prices."

These scholastic "exact experiments," however, if not altogether desirable as direct examples to be followed by the practical farmer, are of immense value as object lessons in assisting the agriculturist to arrive at those general conclusions upon which he may safely base his practice.

One of the greatest producers of corn and live stock in Britain is Mr. John Woolley, Skimblecott, Shropshire, and he has manured on "general principles" during the twenty years he has occupied the farm. It was through the inspection of his farm two years ago that I formulated the expression—"a good phosphatic heart is the foundation of all profitable agriculture"—which has now become proverbial. The Skimblecott farm was in such an exhausted condition when Mr. Woolley entered upon it, that the corn crop was valued at less than £1 per acre; but with such effect did he use artificial manures and cake, that in 1896 he grew the record crop of 77 bushels of wheat per acre (60 lbs. per bushel). It was to learn something of the *modus operandi* of producing such desirable crops that I visited Mr. Woolley. My new friend courteously gave me his farm books to look over (the keeping of correct farm accounts is a highly desirable, but greatly neglected thing), and my attention was at once attracted by the large amount of bones and super-phosphate bought in the earlier years, and Thomas-phosphate during later years, a continuous and extremely liberal application of phosphate throughout; with a corresponding continuous increase of production. Further investigation and consideration satisfied me that there was a direct and close affinity between the two facts: cause and effect.

The farm is 346 acres in extent, and there has been a continuous annual application of from 40 to 70 tons of phosphate. Bones and super-phosphate were used until the introduction of Thomas-phosphate, when it was resorted to, Mr. Woolley telling me that he can now get his phosphatic supply from that source at half the cost of formerly. Although the amount of hay, straw, corn, and fat stock sold off the farm has been enormous compared with its acreage, there has yet been a continuous increase of fertility.

We have had an excessive heat and drought for a few weeks this summer in England, the pastures being, for the most part, burnt up and bare. I thought I should like to see how friend Woolley was getting along under such conditions, so I again visited him two or three weeks ago. I found some hundreds of tons of fodder in the yards; the corn crops as good as need be; ninety head of cattle in high condition; 360 sheep summered and sold fat, others now replacing them; nineteen horses; with pigs and poultry innumerable. But the most surprising thing of all was that even with so much live stock and hay there was yet a great excess of remaining grass. I enclose you three or four photographs I took illustrating this. Of course I was anxious to learn whether the copious dressing with phosphate was yet being continued, as most people would have stopped short long ago. The books showed that seventy tons of Thomas-phosphate powder had been applied as usual last autumn. I cannot say what might have been the effect without the repeated heavy phosphatic dressings, but undoubtedly the results achieved by Mr. Woolley bear marvellous testimony to the efficacy of his system.

In conclusion I may say that Mr. Woolley does not overweary himself with studying exact quantities, but believes in the broad principle that if the land is liberally supplied with plant food, it will yield a remunerative return sometime; and that if, as Mr. Ralston so aptly says, the immediate scheme "gangs alee," a more auspicious season will assuredly arrive.

FRANK WALLIS.

Lincoln, England.
Sept. 22, 1899.