

lutely incorrect, he invoked practice not science to prove his case; and it is very much to be wished that every farmer would devote a piece of land to the trying of experiments for his own satisfaction and the improvement of his own and his neighbours' practice.

I do not of course mean to convey that experimentation is not a part of science generally so called, but we must always remember that science, or knowledge, is the fruit of experiments.

The primary object in every experiment should be to make it *comparative* in its circumstances as regards the field, soil, situation, time, and labour, with a crop raised in the ordinary way. Without making such an extensive comparison, no satisfactory conclusion can be arrived at, since no common ground would exist by which to measure the gain or loss obtained by the experiment. The experiment should also be made on the same kind of crop as the one with which it is compared. For example:—If the field is in grass, which it is intended to plough up for *oats*, then the proposed experiment should be made on *oats*, not on wheat, upon the lea; for no elements of comparison exist between wheat and *oats*.

The ground should also be ploughed in the same manner, which is a point of greater importance than may be imagined. I have known, in a field of lea, of strong soil, the ridges gathered up yield a better crop of *oats* than those cast together; and I have also seen gathered up ridges free from grub, whilst cast ones were affected by that complaint. Mr Stevenson, Redside, East Lothian, obtained a difference in the crop, on different ridges, whose furrow-slices lay in opposite directions. No reason could be assigned for either of those differences;

but they were sufficiently observable to show, that one mode of ploughing land, and one aspect of the furrow-slices, affect the crop in a different manner from another mode of ploughing and another aspect. I have frequently heard it stated, that the crop on the furrows lying to the W. or to the S. is better than on those lying to the N. or the E. Some difference of effect must be produced by the aspect of ridges, for it is clear that a S. aspect will bear a better crop than a N. one, other things being equal. But even if the grain of the experiment and of the crop were the same, if the experiment were made in a different field, at a different period of the rotation, on a different kind of soil, in a different situation, and at a different season of the year, it is obvious that no common grounds of comparison would exist between the two cases, and the particulars of the one would be no guide for directing those of the other. Every particular in the cases must therefore be alike.

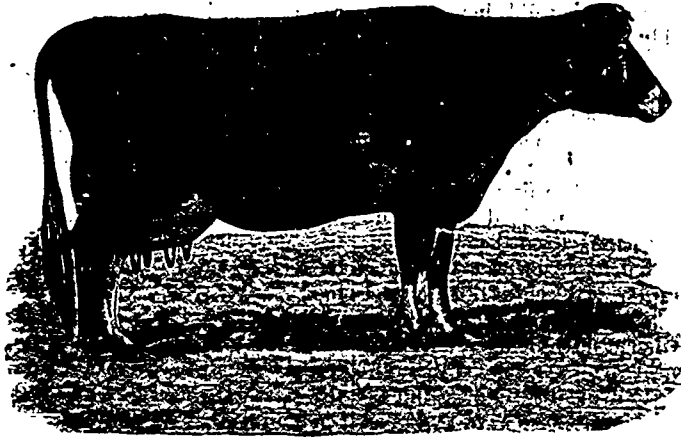
When a comparative experiment is to be tried with different kinds of manure, the land should be manured when in the same state, on the same day, at the same period of the day, and on the crop or crops at the same age; for I have obtained very different results from the same manure applied in the forenoon and afternoon of the same day on the potato, and on the root crop. It is the same with specific or a mixture of specific manure. For example, it will not do to try different specific manures upon grass which has been laid down

after potatoes, against that laid down after roots; nor upon a grain crop after roots which had been eaten off with sheep, against the same kind of crop upon land from which the roots had been carried off altogether. *Comparative* experiments could, no doubt, be made on these different conditions of grass and of grain after roots, were the same specific manure employed, but *different* specific manures will not give *comparative* results in different circumstances. In like manner, it will not do to apply *different* specific manures to *different* sorts of wheat, barley, or *oats*, as each variety of grain may possess such an idiosyncrasy as to be very differently affected in similar circumstances and the results obtained from such circumstances would not be comparative. Experiments may be made on different varieties of crop in different circumstances, without reference to comparison at all; but unless the results of experiments are compared with ordinary practice, no practical use will be derived from the experiment.

Manures of whatever kind should be applied to the soil by the same means. One ought not to be applied by hand, and another by machinery; one in a dry state, another in a state of solution, if it be desired to make the experiment *comparative*.

The states of the manures may be varied, but then they should be applied in the different states in the same circumstances as in ordinary practice, to render the comparison of any value.

I was led to the above remarks by the sight of "Bulletin No. 37 of Massachusetts State Agricultural Experiment Station." This pamphlet is devoted to the elucidation of certain experiments conducted at the Station, with a view to the ascertaining of the cost of food devoted to the preparation of fattening lambs for the meat-



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market. Those experiments are the first of a series intended to be pursued, and are therefore hardly to be dealt with as a completed work, but enough of their tendency is shown to justify me in making a few observations upon them.

And, first, on the subjects—as the Scotch, following the French, say—chosen for experiment: they were as follows:

“Six grade lambs—three ewes and three wethers—bought (Sept. 4th, '89) of a farmer in our vicinity served for our observations. They consisted of five Hampshire Down and one Merino—grades. Each animal occupied during the entire period of observation a separate pen. They were shorn before being weighed at the beginning of the experiment.”

It would have been more in accordance with judicious work to have had all the lambs of the same sex and of the same breed. A merino-grade can hardly be compared, as regards profitable conversion of food, with a Hampshire-down-grade.

“The daily diet of the entire lot consisted, during the first week, of rowen (hay?). They were subsequently treated in two divisions, each comprising three animals. This division was made for the purpose of comparing the effect of two distinctly different daily fodder rations on the financial results of the operation. Division 1 Nos. 1-2-3 received a daily diet much richer in nitrogenous food constituents than the one adopted for Division II. (Nos. 4-5-6). This circumstance was brought about by feeding to the first division as grain-fed a mixture of wheathran and of gluten meal, and to the