December 10, 1941

Dear Peters,

I think I understand the questions of your letter in respect to the variance ratio quantities: interaction. For quantities, that is to say throwing three modes of administration together, we get 6000, 1200 and 800 for the worm counts. The series given by the three different modes of administration must have varied considerably to give both the large variance in mode of administration and the large interaction.

Now it may be that these differences in the response curves are clearly intelligible and unambiguous; but it often happens that, without further tests, it is by no means obvious why one series should have differed from another. If, in this state of African darkness, I propose to apply phenothiazine to my own sheep on the strength of your experiments, I do not know which of your response curves will be most like mine, and the fact that your variance for quantities is not greater than your variance for interaction warns me that the particular response curve which my animals may exhibit may even be unfavourable to the use of the drug.

You may be amused by some preliminary results on calculations I have made using both initial weight and first egg counts to predict

final weight. The sheep at Edinburgh were much smaller than yours, but the gross results are suggestively similar. There is a peculiarity in your data, and perhaps in others, which I cannot at present understand, namely, that the differences of your results from a smooth response curve are far greater than they should be as judged by the 15 degrees of freedon available for pure error from the comparison of sheep treated, so far as I know, exactly alike. These give a standard error, estimated for the mean of four sheep, of only 2.166 lbs, so that one can see at a glance that something has effected the response to 30 gms or 40 gms compared with neighbouring doses to an extent much larger than can be attributed to the causes of discrepancy between parallel animals. This throws so much doubt on the apparent response that I did not believe in them until I had seen the Edinburgh data. The two lots together do seem to indicate that, even in the short term experiment, 20 or 30 gms per sheep has given a very decent return in mutton, but that 50 has nearly poisoned the poor animals.

Could you tell me whether, in the Inside experiment, the pairs of sheep treated alike are segregated in their daily regime from other pairs in such a way as to supply any possible explanation of these large discrepancies?

Yours sincerely,

/ Calculation - preliminary results

Final weight adjusted for initial weight and initial egg count.

Dose g.	Winches Farm lb per sheep	Excess over control	Edinburgh lbs per sheep	Excess over control
0	63.135	-	37.904	-
5	64.009	.824	40.852	.848
10	67.255	4.220	40.220	2.316
20	74.754	11.619	39.900*	1.996
30	66.182	3.047	41.056	3.152
40	70.933	7.798	41.516	3.612
50	63.171	.036	38.132	.228

* one sheep in four missing