

DISCUSSION OF RESEARCH UNDER A.

(1) *Marton Experiment Farm.*

(a) *Measurement of Pasture-production throughout the Year by mowing with a Lawn-mower.*—This method is now being applied to six lines of investigation. The technique appears to be very satisfactory, with the exception of one or two minor defects which should be easily rectified. The main objective of this trial is to determine what kinds of manure, what methods, and what times of application are best suited for increasing grass-growth as much as possible during periods of low production. In other words, the object is to level the production curve as far as is possible by bringing up the low points.

(i) Trial of effect of applying super and slag in winter, spring, summer, and autumn applications respectively: This trial has been under way since August, 1928 (twenty months). The main features are: (1) That super shows a consistent superiority over slag, especially during low production periods; (2) that summer application of superphosphate has the greatest effect in increasing growth during low-production periods from February to August; (3) that fluctuation in production is enormous, ranging from about 10 lb. per acre per day to 300 lb. per acre per day of green material; (4) that the system of measurement adopted is not harming the production, but rather improving it, as any proper system of pasture management should.

(ii) Trial to determine effect of three distributed applications per annum of super + sulphate of ammonia, and super + sulphate of ammonia + potash, and to compare ammonium phosphate and Nitrophoska with the appropriate mixtures above: The trial was commenced in August, 1929. The general indications are—(1) That a 2 cwt. dressing of sulphate of ammonia applied in August increases production for a period of between two and three months; (2) that a 1 cwt. application in November increases production for about two months; (3) potash has had small but consistent effect in increasing production; (4) that the ammonium phosphate used (Leun aphos, 20 per cent. N and 20 per cent. P_2O_5) is equal to an equivalent amount of N and P_2O_5 in the mixture of super and sulphate of ammonia; (5) that Nitrophoska is not quite as effective as an equivalent amount of N, P_2O_5 , and K_2O in mixture of super, sulphate of ammonia, and muriate of potash.

(iii) Trial to determine whether a heavy application of super at infrequent intervals is as effective as smaller applications at more frequent intervals: This trial was commenced in August, 1929. The treatments are arranged so as to supply 4 cwt. of super per acre per annum in the following ways: (1) 8 cwt. in two years; (2) 4 cwt. once a year; (3) 2 cwt. twice a year; (4) $1\frac{1}{2}$ cwt. three times a year; (5) initial 4 cwt. plus $1\frac{1}{2}$ cwt. three times a year. The general indications are—(1) The 8 cwt. application was slightly superior to the 4 cwt. until the middle of December; after that date its superiority became very marked and continued to be so until the present time; (2) the initial application of 4 cwt. plus $1\frac{1}{2}$ cwt. three times a year is next in order of superiority; (3) all treatments have yielded more or less into proportion to the amount of phosphate applied to date. (NOTE.—It would be inadvisable to draw conclusions from these results until after two years from the time of starting.)

(iv) Study of effect of applying sulphate of ammonia at intervals of two months on different plots: This trial was commenced in August, 1929. Two hundredweight of sulphate of ammonia per acre is used at each dressing, the ground having been treated with lime, phosphate, and potash in August. The general indications are—(1) That sulphate of ammonia applied in August continued to have effect for about two months; (2) that sulphate of ammonia applied in October and December increased production for a little more than a month in each case; (3) that summer applications "burn" badly and cause an initial falling-off in production, followed by an increase, which in turn is followed by falling-off in production relative to a "no nitrogen" plot; (4) all applications of nitrogen have increased production for a time, but the increase is followed by a depression of about 10 per cent. relative to a "no nitrogen" plot. This did not occur in trial (ii) above, where phosphate and nitrogen were applied together as super + sulphate of ammonia or as ammonium phosphate.

(v) Trial to determine the effect on production of utilizing herbage at 2 in.-3 in. stage and 4 in.-5 in. stage: Trial commenced November, 1929. The general indications are—(1) That where grass is utilized at the shorter stage its growth-production is lessened. (2) The cutting at 4 in.-5 in. stage resulted in 20 to 30 per cent. greater production than cutting at 2 in.-3 in. stage: this substantially confirms Woodman's results in England. (3) The practical significance is that in a system of rotational grazing the herbage should be left as long before grazing as is commensurate with proper utilization by the stock being used. It is quite practicable to allow pastures to grow to 4 in.-6 in. when cattle are being grazed, but a much shorter growth stage would have to be adopted when sheep are used, as they tend to foul long grass and suffer from foot troubles under wet conditions.

(vi) Trial to determine whether any loss of nitrogen occurs when sulphate of ammonia is mixed with carbonate of lime: Trial commenced in November, 1929. The investigation is important, in that continued use of sulphate of ammonia increases soil-acidity. It appears that $1\frac{1}{2}$ cwt. to 2 cwt. of carbonate of lime is required to neutralize the acidifying effect of 1 cwt. of sulphate of ammonia. If mixing of the two is safe, the mixture has a very good mechanical condition, and is easy to apply. Chemical determinations indicate practically no loss of nitrogen on mixing, providing mixture is reasonably dry. The field results to date indicate—(1) That sulphate of ammonia "burnt" clovers badly, but sulphate of ammonia + lime did not "burn" to any appreciable extent: this may be due to more friable condition of mixture and less adherence to leaves. (2) That sulphate of ammonia caused a depression in yield as result of burning, followed by an increase in production over sulphate of ammonia + lime; this was followed by a reduction in production relative to sulphate of ammonia + lime about two months after application, with a return to the same rate of production three months after application. (3) The comparison of the two methods should be better during autumn and spring, when the nitrogen effect will be more considerable.