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Soil Fertility and Agricultural Policy

SPEAKERS in the discussion in Section M (Agriculture) following the presidential address to the Section at Cambridge agreed that agriculture in Great Britain is declining and the land suffering. The only possible approach to a stable and long-term agricultural policy must be a national one, directed not merely to the production of commodities but also to the maintenance and enhancement of soil fertility.

In his presidential address on "Ley-Farming and a Long-term Agricultural Policy", Prof. R. G. Stapledon stressed the need for maintaining a large and contented rural population with the greatest possible acreage of fertile and ploughable land, managed so as to allow the utmost flexibility of production. The vital need of Great Britain for an abundant supply of fresh food is threatened not merely by war danger but also by the effects of soil erosion and soil depletion in the countries on which we have come to rely for cheap food. The possibility of producing sufficient amounts of fresh food ourselves is not compatible with our present superabundance of permanent grass. We need a survey on the land to map the main types of farming and the facilities of individual farms in order to determine both our potential food production and the way our schemes for subsidizing commodities and planning marketing are affecting the fertility of the land.

Prof. Stapledon gave the following outline classification of farming systems: (a) arable farming, including a one-year ley for hay and for maintaining soil fertility, (b) alternate husbandry or ley-farming, with arable cropping alternating with leys of either two or three or four to eight years' duration, (c) nondescript farming, in which the arable land and the grassland occupy separate parts of the farm, and (d) permanent grass. He criticized the last system on both general and technical grounds. Even the poorest permanent grass retains some earning capacity, but it does so at the cost of a low standard of management, complete dependence on imported foodstuffs and great wastage of both manurial residues and potential fertility. Again, as a later speaker said, "Permanent pastures perpetuate parasites".

The best grassland holds within itself an immense store of fertility which can be cashed only by ploughing and cropping and thereby preparing the land for still better grass. The urgent need for lime, which has been emphasized by increased milk production and by the slaughter of young animals, can best be met by applying the lime when the land is under the plough. On the poorest soils there is nothing to equal continued ploughing down of sod, accompanied by lime and phosphate, to build up fertility. Prof. Stapledon particularly recommended the use of contrasted types of ley in rotations—one- or two-years' ley for hay and

deep-rooting residues, and four- to six-years' ley for grazing, leaving shallow-rooting residues rich in clover. Experimental work is needed to discover the best rotations for individual districts and especially to find means of establishing leys without undue risk on the heaviest soils and in the driest regions. These problems and many others in agriculture are more likely to be solved by agronomical investigations than by scientific research. Facilities for conducting field experiments should be enormously increased.

The only solution for our derelict areas is to determine by a survey which fields must be ploughed up and then to devise means of supplying working capital and ensuring its correct expenditure. From his experience in North Wales, Prof. Stapledon favours the idea of loans with a working plan through a 'master borrower' with the necessary tractor and other equipment, or through scheduling districts for a rehabilitation loan on an agreed plan. He believes, too, that the advantages of a more balanced specialization would be secured by a system of 'share farming' by which, for example, a mechanized wheat grower and a poultry farmer might operate over a number of neighbouring ley-farms devoted mainly to milk.

Dr. W. G. Ogg stressed the necessity for checking the drift of poor arable land through inferior pasture to rough grazings and wastes which would ultimately require very difficult and costly reclamation. He doubted whether private individuals, even with cheap long-term credits, could undertake the reconditioning, and suggested that it would have to be done by the State or by some State-aided corporation, working in much the same way as the Forestry Commission does on land which the private owner is unable to afforest. When the land has been reconditioned, and buildings, fences and water supplies made satisfactory, the farms could be rented with a clause in the lease to require suitable manuring and cultivation. Dr. Ogg showed by films some of the work of the Macaulay Institute for Soil Research in the reclamation of peat in Lewis and in Lanarkshire. Satisfactory hay, pasture and silage have been secured by installing long wooden box drains leading to open collecting ditches and by using a rotary cultivator drawn by a caterpillar tractor, and supplying a cheap source of lime and the necessary fertilizers. The spongy fibrous peat from *Sphagnum* in the Lanarkshire experiment has proved more amenable to treatment than the slimy *Scirpus* peat of Lewis, though in the drier parts of Lewis pasture has been established without cultivation and with very little drainage by using fertilizer, grass seeds and clover cleanings. The Lanarkshire experiment was undertaken for the Commissioner for Special Areas in Scotland,

and it was estimated that full reclamation would cost about £20 per acre.

In analysing the basis of soil fertility and crop rotation, Dr. E. M. Crowther emphasized the importance of soil structure and plant cover. The essential contrast is between periods of cultivation with rapid oxidation, leaching and degradation of structure, and restorative periods under a vegetational cover leading to granulation of the soil, the return of nutrients to the surface and the production of active colloidal organic matter. Under extreme conditions it has generally been found necessary to restrict, either by prohibition or by compensation, the amount of grazing or the proportion of the land occupied by the most wasteful crops, notably the widely spaced row crops with frequent cultivations. Under our more temperate conditions, there is a need, especially at college farms, for long-range experiments along the lines of recent Rothamsted and Woburn experiments on crop rotations, testing the restorative value of leys, lucerne and green manures and the residual value of straw used directly and in farmyard manure and composts. The use of fertilizers could be made far more efficient by combining a co-ordinated series of field experiments with soil surveys and soil analyses. Such series of experiments are carried out annually in their thousands in most of the other countries of northern Europe, whilst soil analyses have been used by the million in mapping for advisory purposes.

Introducing the discussion on the papers, Sir Daniel Hall said that extra livestock cannot compensate for decreasing crop production, since they are merely the manufactured products of imported foodstuffs. Remedial measures costing some £40,000,000 annually were intended to maintain the *status quo* of our farming, but are not succeeding. Better farming needs a measure of control through the landowner and cannot come through financial stimulus alone. The landowners of Great Britain are so hampered by legislation and the immediate returns are so problematical that the landowners have ceased to have much influence on the farming of their land. Even though land nationalization may not become a matter of practical politics for decades, he suggested that a body should be set up and subsidized by the State to purchase the second-class and poorer land, and get it into order and farmed properly. Such a form of State activity is as necessary to-day as the production of shells and aeroplanes for defence. The State is constantly acquiring large quantities of land for these and similar purposes and "it should also busy itself similarly for the purposes of peace and for improving its own personal estate. If not, what is the alternative?"

E. M. CROWTHER.