

The Problems of

ADJUSTMENT IN AGRICULTURAL DEVELOPMENT.*

S. M. WADHAM, M.A., Professor of Agriculture, University of Melbourne.

THE people of the world at large might be divided into two groups—those who like changes and those who do not. In the former group are the young and impetuous; in the latter the timid and aged to whom a little stability, with its fancied security, has attractions which were perhaps not so apparent twenty years ago. The agriculturist may belong to either group, but if he is part of a modern community he ought to recognise the inevitability of change. The shorter the farming history of the land he works, the more likely is the need for change and re-adjustment.

Australian agriculture is essentially new. As a nation we started in a country in which cultivation was unknown, and in which even grazing was carried out only by wild animals treated as game by the native population. Everything we have done in developing our farming has meant changing the country.

The Wool Areas.

As grazing for wool production alone was the first of our farming industries to develop on a grand scale, I will start by referring to it.

Flocks, by their grazing methods, bring about considerable alterations in the botanical composition of the natural pasturage. From the point of view of necessary nutrients available in the soil, however, little harm may be done to the property as a whole if the stocking rate is adequately adjusted to the capacity of the herbage. It is true that, within the property itself, there will be some tendency for a transference of the nutrients contained in plants towards those places at which the stock frequently congregate; but given care this need not be important. This simple system of grazing can therefore continue for long periods with little or no deterioration of the property—always provided that those responsible for its management make certain that they understand the precise methods by which the more valuable grazing species are regenerated and the less valuable ones suppressed.

I am not in a position to estimate how far this criterion is satisfied in the various types of wool-producing properties scattered over the length and breadth of Australia, but I

have seen quite a number of regions in which deterioration seems to me to have been marked. The task of the agricultural expert here is, first, to be able to recognise the plant communities which are characteristic of soil and climate in each district; secondly, to recognise when these have been or are being degraded by over-stocking; and thirdly, to work out the precise methods of stock management under which regeneration can be ensured—a large programme, but an important one if we are to be certain that some of our drier inland country is not passing along the same path of degeneration as parts of North Africa.

Changes Due to Intensive Grazing.

On the more intensive type of grazing property from which a considerable proportion of stock (whether cattle or sheep) are sold, the soils have to stand a rather greater drain of nutrients because of the extra amounts of such substances which leave the property in the carcasses of the animals sold. Where such properties are of low carrying capacity and the ordinary soils fairly rich, the loss may be unimportant, but where stocking rates are high, the process of degradation of the nutrient reserves may become of real significance.

It is convenient to group here those dairy farms on which no crops are grown and where pasturage in the paddocks (or possibly conserved as grass hay) forms the whole, or nearly the whole, of the food for the herds. On such properties the drift of fertility to the paddocks around the homestead or the milking shed and the deterioration of those more distant is often marked.

On many properties in this group the farmers have realised during the last twenty years the change which can be brought about

* Extracts from the 1947 Farrer Oration, delivered by Professor Wadham during the State Conference of the Agricultural Bureau of N.S.W. held at Hawkesbury Agricultural College, July, 1947. The theme of the Conference was "The Rural World is Changing Too."

by the use of phosphates and sometimes of other chemical dressings to the soil. This is particularly true of most soils in the moister parts of the southern third of the continent, where the simple process of top-dressing with superphosphate is now regarded as an essential part of farm management.

Trace Element Deficiencies.

This, however, is by no means the whole story, and we have to recognise that such top-dressing is not the answer to the problem of declining fertility in all cases. Prominent among these are the soils in which phosphate fixation takes place and the other poorer types in which other nutrients than phosphate become deficient. In Victoria, thanks to the work conducted by the Department of Agriculture for the Pasture Improvement League, we now know that incipient potash deficiency is a matter of vital importance in some districts, while in every State trace element deficiencies of one kind or another occur naturally or have gradually developed in some localities. I need not enlarge upon the work which has been done by the Waite Institute or in Western Australia and other places in overcoming these deficiencies.

We can, of course, contemplate a continual increase in the number of chemicals which we add to our ordinary fertilisers, but the prospect of finding it necessary to work along these lines is somewhat alarming, and possibly some radical change in general farming practices would meet the case more effectively. The problem is, of course, by no means new.

The Hosier System of Dairying.

In Britain, the most striking change which has gradually taken firm root during the last quarter of a century has been the development of the movable cowshed under the "Hosier" system. This is particularly effective on the poorer types of soil and where considerable quantities of bought-in concentrates are fed. Each ton of such material consumed by the animals means a certain amount of nutrient matter returned to the soil. The results are striking in the immense improvement in the type and carrying capacity of the pastures treated in this way.

It seems reasonable to suppose that some adaptation of this system should give comparable results in appropriate dairying districts in Australia. If preliminary investigations show that such is the case, then it

will be necessary to amend the legislation which governs the construction of milking sheds, and also to find farmers who have the courage to make the change and to withstand the almost certain contemptuous banter of their neighbours. Mr. Hosier had to battle his way through all these difficulties.

Cause of Change in Pasture Composition.

I referred earlier to the gradual change in the botanical compositions of pastures which takes place as a result of prolonged grazing. This may be due to one of two main causes. It may be that the available amounts of some element in the soil fall below the levels required for more effective grazing plants. Alternatively, it may be due to the selective grazing of the animal, which tends to suppress the more valuable species and leave those which are less worth. Instances of this are widespread, and one cannot but notice the number of properties with pastures which were once composed of highly nutritious species and which have gradually been invaded by other less productive or less nutritious types—except perhaps the paddocks around the homestead which have been enriched, and sometimes as a result have been invaded by prolific and aggressive weed species. This deterioration of the outer paddocks can sometimes be overcome by the use of fertilisers, but in many cases is, I believe, influenced by the vagaries of our fickle rainfall.

Improvement by Mixed Farming.

Under such circumstances improvement can often only be achieved by transferring from pure grassland farming to mixed farming practice. The pastures from which the better species have largely disappeared are ploughed up and ultimately re-sown, the cost of these operations being largely or wholly met by the cultivation of a cereal or other crop for one or two years after the land has been broken up. The extra fertility accumulated in the upper soil layers of a pasture can thus be "cashed" during this short period of cultivation.

While it is all very well to talk about a change of this type on theoretical grounds, the proposal often looks very different from the point of view of the farmer. In the first place, he may not be accustomed to growing crops; in the second, he frequently lacks the machinery to do so and quite frequently his farm is relatively small in size and thus a

disturbance of his normal practice may affect his annual working account. If the farm is, say, 100 acres, and he intends to crop only two years in, shall we say seven, he will have on the average about 28 acres under crop in any season. This is a small area for which to maintain a set of machinery, and if the farmer has to purchase it the extra capital involved is rather high. Then there is the trouble of finding the necessary labour to do the work at harvest time when everyone is busy and labour is most difficult to get in some districts.

Disease Control and Fodder Conservation Problems.

Let us turn to another aspect of the results of pasture improvement. In our moister districts on medium soils, where phosphate deficiency is the main obstacle to the establishment of better pastures, the addition of superphosphate frequently trebles the carrying capacity of the land. This is all very well on paper, but those of you who are in touch with the problem well know that other results almost invariably occur.

In the first place, much more attention must be given to the sheep in order to avoid the dangers of serious foot-rot and of worm parasites, for the appearance of these is more likely unless adequate precautions are taken.

The second and even more important consideration arises from the fact that the increased carrying capacity involves an increase in the stock on the property—and it is no use carrying more stock unless one has the capacity to carry them satisfactorily when the period of growth of the pastures is meagre.

This question of reserves is all-important in the case of dairying. I sometimes hear people refer to dairy farmers as “cow cockies.” I object strongly to the term, but at the same time I am bound to admit that those dairymen who merely milk cows without due consideration of the food requirements of their herds deserve the epithet. Surely it is time that every person worthy of the title of “dairy farmer” should know the basic requirements of the cow’s nutrition—firstly, that it must be well fed for the last two months of pregnancy; secondly, that it should be fed according to its individual yield of milk; and thirdly, that this

involves giving supplementary rations, sometimes of dry fodder or even roughage, and sometimes of concentrated feeds high in protein.

New Leguminous Concentrates.

If a properly balanced feeding programme were generally carried out on dairy farms, there would be a need for reserves both of bulk feeds and concentrates. At the moment (or even under pre-war conditions) I doubt whether the necessary foodstuffs would be available. The majority of dairy farmers, when they want concentrates, seem to me to rely far too much on bran. It is high time we studied both the production and the use of alternatives. During the war we have, of course, used fair quantities of whole wheat, but it should be practicable to develop the cultivation of some species of leguminous seed which would be higher in protein and could be grown with advantage—the type would vary with the district.

Nothing which I have said should be taken as an inference that it necessarily pays to supplement the feed of dairy cows irrespective of the economics of the process. This will, of course, be governed by the relative prices of the foodstuffs and of the product of the dairy farm (whether whole milk or butter fat). Very few dairy farms are so advantageously placed that their cows would not be more efficient producers if supplements were used during part of the lactation, and especially during the period immediately preceding it.

Changes in the Wheat Areas.

Turn now to the wheat areas, in which I believe soil deterioration has gone a long way on many farms. The historical sequence is worthy of notice. Many pioneer wheat-growers in the wheat belt proper started with fairly good soils and grew moderate crops when seasons were favourable. They were assisted as time went on by the development of special machinery and, in particular, by the work of the plant breeders, among whom Farrer was the giant of his day.

Repeated cropping was the common practice, but gradually it became clear that the gamble of the repeated crop was not a good one in most districts. On the medium and light soils farmers found that resting the land for a season gave a better result in the following year. On the heavier soils the

ancient practice of fallowing became frequent, but on some types within this category the degradation of the physical condition of the surface layers made wheat growing more and more speculative.

In the 'nineties the value of superphosphate was demonstrated. Its use was then a new practice to the wheat-belt, but it was really a recognition of the fact that years of cropping took so much out of the land that the amount of phosphate available had become insufficient for the needs of a healthy, productive plant. By 1910-20 the practices of alternating crop with fallow and of using superphosphate had become frequent in many districts. Sometimes the fallow was replaced by oats, and on a few farms the rotation was made longer still, crops of lucerne, peas, or barley being introduced according to the district.

By the 1920's farmers in the drier parts of the wheat zone, at least in South Australia and Victoria, were beginning to discover that a longer period of rest between crops produced good results. The land could be used for grazing during the intervening years, and with the increasing residues of phosphate in the soil the type of volunteer plant which came in on the stubble improved, while after the longer spell the wheat crop was usually a good deal heavier. Nowadays most farmers know this, and the increase in the number of sheep on wheat farms has been marked, although the drought of 1944-45 was a severe set-back to many.

The Requirements of a Longer Cropping Cycle.

This general observance of a longer cropping cycle requires three things—first, that the farm shall be large enough to give reasonable employment to the machinery and the capital invested in it; second, that the farmer shall learn what kind of sheep is suited to his property, and take the trouble to understand the proper management of his flock so that running them becomes a profitable enterprise; and third, that he shall conserve sufficient reserves to ensure that he is not caught without feed in the drought year when it comes along. Of course, it all means more trouble, but if we are not prepared to take that trouble, are we justified in claiming that we are progressive farmers?

"Ley" Farming is Desirable in Some Districts.

On some soil types it seems to me quite clear that a system of "ley" farming is immensely desirable. Under this, the land will, after being cropped with wheat, be put down under grazing which should certainly contain some form of leguminous plant. I said "put down" to grazing, for although "volunteer" species are sometimes quite satisfactory, this is not always the case.

After several years of this use of the land, the soils are cultivated much more readily and give greatly improved yields. This has been officially demonstrated on some experiment farms, and is becoming common practice by a good many men on medium or poor types of soil and in districts of moderate rainfall. Doubtless the prospective high price of wheat in the next year or so will give the movement a set-back, but the principles underlying it are sound.

Steady continued research as to the most satisfactory species of grazing plant to be used, and demonstration of the merits of the new system when compared on a basis of costs and returns, with other systems, ought to be a definite feature of the field investigations by those bodies which are interested in agricultural progress. The difficulty is to find satisfactory grazing plants or possibly alternate crops, especially of the leguminous type, which will make reasonable progress in the areas of low and uncertain rainfall.

There is Need for Greater Knowledge.

You will notice that these various changes which I have suggested as desirable in the agricultural systems of our different types of farming are all dependent on certain things. First, the acquisition and/or dissemination of more knowledge; second, in some cases, an adjustment of farm areas so as to make them more efficient in regard to machinery; third, the provision of such machinery in an economical way; and fourth, in some cases, extra labour to do the work. Each of these factors requires some comment.

I am painfully aware that we still have a lot to learn both in regard to the basal scientific facts, and also as to the most efficient methods of doing things. We know that on some soils this "ley" farming system works; what we don't know is what precisely happens in the soil which makes it easier to cultivate after it has borne a pasturage for

some years, and whether it is nitrogen or some other element which becomes more available during that period. Again, in regard to our pastures, we do not know precisely what is the most efficient means of putting by fodder reserves in each district or, equally important, the most efficient method of feeding reserve forage and concentrates out to livestock during a dry period. Nor do we know what sort of leguminous crop we can introduce into our drier districts with success. These are problems for the agronomist and other scientific workers in agriculture.

Areas and Machinery Must be Used Efficiently.

The second requirement, adjustment of farm area, is, of course, usually a difficult matter, and can only be worked out in process of time. If neighbours would work together more frequently than they do at present, we should be in a happier position because economies in the amount of machinery required can be arranged in so doing. In this way some of the smaller farms could be made more effective economically.

In any case, as regards the third requirement, it is probable that the most efficient way of putting aside reserves, particularly on grazing or dairying properties, is one which will require the use of large-scale machinery. Some progress has been made during the war in the development of machinery pools. Unfortunately, experience tells us that people are ready to do all sorts of things and make all kinds of allowances for other people during a period of national stress, but they are not so ready under normal conditions.

Clearly, there is a great need in two directions—first, for an accurate investigation of the costs of running machinery on a pooled plan, whether it be co-operative in character or run by the State; and second, for a study of the most effective means of getting groups of farmers to understand what is a reasonable basis for such a machinery pool or co-operative. Farmers who think of such an organisation merely as one from which they can get assistance just when they happen to want it, fail to recognise that membership implies obligations as well as benefits from such an organisation if it is to work beneficially. I have been very interested to notice that the Economics Division of the New South Wales Department of Agricul-

ture has started investigations of this kind. Where butter factories or other co-operative processing organisations exist, they have a great opportunity to spread the principle for which they stand among their members by taking an active part in such organisations.

Efficient Labour Must Be Obtained.

Finally comes the labour problem. In my opinion, few forms of farming can be efficient if conducted on the basis of one-man farms. The reasons have been stated elsewhere, and I will not repeat them here.

It is no use expecting to be able to maintain a form of farming which requires the employment of one or more paid workers if conditions in the labour market are such that these workers are not available. I do not know what the situation is like in New South Wales, but in most districts of Victoria experience suggests that there is an acute shortage of efficient agricultural labour. This difficulty is not likely to be overcome by sitting still. I suggest that we have to recognise that farm work has a bad name on the labour market, and until we can put that right, efficient workers will not become available.

The acceptance of some sort of guarantee by the farming industries, both as regards the wages which will be paid and the conditions under which farm workers will be expected to live, seems to me very important. I don't know whether the right course would be to deal through the normal machinery of wage-fixing boards or arbitration courts, but personally I am attracted by the thought that it should be practicable for groups of farmers or for farmers' organisations to get together and draw up reasonable standards which they would guarantee to prospective employees. It may be that this would be such a departure from pre-war practice that farmers would not be prepared to enter such a scheme, but in my opinion this would be the best solution of the problem.

As regards housing on farms, some approach to housing authorities generally may be necessary. Developments of this kind have been the normal procedure in England for about twenty years, and I don't see any reason why the problem of improving housing levels on farms should not be as much a matter of national concern, as is the abolition of slum areas in cities.

These Problems Must Be Solved.

I chose this subject, not because it is of great scientific profundity, but because of its importance. In many districts one can see so many instances of farms which are not well run, pastures which are poorer than they should be, crops, the poor yields of which are not solely due to climatic vagaries, stock which are not reasonably well fed even when there is no question of a drought, or soils which although not eroded, tread very hard under the foot and could probably be made far more tractable and more fertile.

It would be interesting to discover whether the causes lie in financial poverty or in lack of courage to strike out a new line, or in blind satisfaction with things as they are and refusal to recognise what they might be, or to pure laziness and inertia.

Whatever the causes, they are the main obstacle to agricultural progress in this country, and unless we can overcome them we shall remain among the less progressive agricultural nations of the earth—blaming our droughts rather than grasping the need for mitigating their effects.

Approved Vegetable Seed—September, 1947.

CONDITIONS under which names and addresses of growers of seed of recommended varieties of vegetables will be listed, as hereunder, in *The Agricultural Gazette* were published in the November 1946 issue.

Further details of these new conditions, together with application forms, are available to seed growers from the Chief, Division of Plant Industry, Department of Agriculture, Box 36A G.P.O., Sydney.

Varieties Listed.

Cauliflower—

Phenomenal Five Months—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Cauliflower—continued.

Russian 2A—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Onion—

Hunter River Brown Globe—C. J. Rowcliff, Old Dubbo-road, Dubbo.

Pumpkin—

Queensland Blue—R. C. Morandini, Box 74, Dubbo.

Tomato—

Rouge de Marmande—H. P. Richards, "Sovereignton," Tenterfield.

Pearson (Moscow)—H. P. Richards, "Sovereignton," Tenterfield.

Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alteration of dates should be notified at once.

1947.

Corowa (W. T. Easdown) ...	September 12, 13
Singleton (N. Shaddock) ..	September 17, 18, 19
Molong	September 19, 20
Ardlethan	September 20
Eugowra	September 23, 24
Leeton (L. C. Tweedie)	September 23, 24
Quandialla	September 24
Junee	September 26, 27
Ariah Park	September 27
Bribbaree	October 1
Walbundrie (C. Leischke)	October 1
Hay (G. Johnston)	October 3, 4
Goolgowi	October 4
Illabo	October 4
Culcairn	October 4

Albury Annual Spring Show

(A. G. Young)	October 7, 8, 9
Kyogle	October 8, 9
Cootamundra (D. Boyd)	October 10, 11
Hay	October 14, 15
Lismore National	October 14, 15, 16
Alstonville	October 22, 23
Holbrook (Thelma Stewart)	October 24, 25
Murwillumbah	October 29, 30
Griffith	October 30, 31.
Mullumbimby	November 5, 6
Bangalow	November 12, 13
Nimbin	November 19, 20

1948.

Bega (Jas. Appleby)