DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

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THE PROBABLE UTILISATION OF N.Z. GRASSLAND.

The future utilisation of New Zealand's grassland resources will depend largely upon a series of economic factors among which will appear.,

(1) The price level for grassland products.
(2) The alterations in the flow of international trade.
(3) Population changes ,
(4) Changes in 'the nature- of demand for grassland products.

Pasture is grown for the following purposes:-

(1) To produce food products, (milk, butter, cheese, meat and eggs).
(2) To produce clothing, wool skins, hair, hides.
(3) To produce seed.

Conditions of Development of Newer Grassland Knowledge.

It is important to recognise that the main stimulus to the advance of grassland knowledge which has taken place at accelerating pace during the past quarter of a century has been the constant prevalence of a state of scarcity of grassland products available for the world's people. The Empire Marketing Board's policy was, for example directed for the most part towards increasing the quantity of food and clothing supplies and decreasing their costs.

In these circumstances grass came to be recognised as a crop, the influence of chemical fertilisers in promoting grass growth were proved, the importance of strains in those grasses and clovers most suitable for fertile'line was demonstrated, the high protein content of young grass (and particularly of young New Zealand grass) was revealed and the rôle played by the mineral content of grass in 'regard to animal health at various seasons of the year was made apparent. This recapitulation of some of the marked advances which have rapidly occurred serves to remind us of the distinctly recent nature of the new grassland knowledge, It would be remarkable even in a most progressive community to expect that the greater portion of this- new knowledge is yet assimilated by farmers in general and adopted in practice.. One has not to travel far in New Zealand to realise that as Yet a great deal of this new knowledge remains unexploited. The prevailing economic conditions contribute to prevent farmers even though they are willing , from adopting into practice newer methods involving a capital outlay while the severity of the price fall and the general economic conditions provide little or no inducement to effect improvem'ents . The inertia of a conservative industry, the need for making not one change byt a whole series if maximum exploitation is to be secured do render rapid assimilation of new grassland knowledge a little difficult.

If no new knowledge beyond that which at present is available and all effort was concentrated upon putting this into practice so that our grassland was sown under better conditions, with better strains of grasses and clovers, topdressing adequately done, carefully managed and utilised to best advantage for feeding to stock, then it would appear that there would be an overabundance of produce which would not find sale at a profitable price *in the* worlds markets. In the interest of maintaining a certain price level quotas are already arranged for meat but fortunately these are sufficiently generous to cause no immediate concern. The threat of quotas remains however and every farmer is aware that there is no encouragement now being given to produce more and still more.

Some Conditions conducing to Increased Demand.

In view of the waiting, yet unused potentialities *of New* Zealand grassland it is well to examine the possibilities of finding markets which will expand at a rate comparable with that of production,

How may demand be increased.?

(1) By the removal of trade barriers. I think it is reasonable to anticipate a gradual reduction in tariff barriers and slow resumption of the flow of international trade. Past history has shown a periodical erection and demolition of trade barriers following in a series of waves. It must not be forgotten however that these barriers will have during their existence helped to some extent agriculture in countries so protected and will have placed their people on a better competitive basis against New Zealand. Trade barriers have however by reducing the total volume of the world's commerce depressed prices and have been productive of serious embarrassment to farmers in all exporting countries,

(2) By a restoration of confidence and stabilisation of exchange which together will help in the revival of trade.

(3) By an increase in the standard of living leading to increased consumption of grassland products. While it is true that there have been marked increases in the per capita consumption of certain grassland products e.g. butter in recent years, yet to this there are definite limitations. Increase in the standard of living may be expressed in a demand for products other than those derived from grasslands. Most grassland products are food products and with a rise in the standard of living the following usually occurs (1) a tendency to widen the range of goods consumed (2) to decrease the amount of any one class of food consumed, (3) to demand a higher quality of foodstuffs. In total volume the consumption undergoes little change, the capacity of the human stomach placing a distinct uppsr limit on this.(4) By an increase. in population.

One of the most disquieting features associated with a study of the economic future is the slowing down in the rate of population increase of the European races. During the whole of the period, when Europeans were settling in America, Africa and Australia populations increase both at Home and abroad was proceeding rapidly, Within the past twenty years or so the increase is proceeding at a much slower rate and 'in some cases is approaching a stationary stage. Between 1913 and 1932, world population increased by 12% while that of Europe grew to the extent of only 2%. In New Zealand in 1933 the natural increase was 9 per 1000 the lowest on record and our increase in population amounted to some 10450 only. Such a condition brings in its train distinct changes in the nature of the goods consumed.

As Dr.. Condliffe observed in the World Economic Survey (1933-34 (13). "A population which'is approaching a stabilised maturity will develop economic demands very different from those of a rapidly expanding community. In particular, the consumption of elementary necessities will not greatly increase, though there will be a strong tendency towards. extending their variety and improving their quality. New foods come into use, the range and quality of clothing are much improved and the standard of housing is also raised,; but for the stable foods and the commoner articles of general consumption, demand lags behind the increase in wealth. On the other hand, there tends to be a rapidly widening demand for more costly goods of durable consumption and also for the personal services, and for the perishable consumption goods which often are connected with the new durable goods, such as motor-cars."

Production.

Contemporaneously with this technical improvements in production have proceeded at a remarkable rate both in agriculture and in industry. Probably at no time in the World's history has it been easier to provide the foodstuffs necessary for the race than today, even though there are all too well recognised defects in distribution. There is reason for fearing that in some classes of grassland produce, e.g. butter and beef,, that satiety is being approached in the markets at present available for N.Z. produce. There is moreover a marked distinction between human food requirements which once satiety is reached are relatively inelastic and human requirements for other goods

which are very elastic. A resumption of population increase to its original rate would therefore be distinctly advantageous to the demand for grassland products. A restoration of industrial prosperity overseas,.' and closer settlement locally are therefore highly desirable and perhaps less attention towards striving for an alleged higher standard of living as a goal.

Diversification.

'Such were prices and demand for the main grassland prcaucts for several decades up to 1930 that a'marked tendency existed for the restriction of these to certain definite main lines. Returns from a few main lines of produce were good and diversification was unnecessary, Progress now. resents the threats of restriction to be imposed on these goods. But when such circumstances appear it is. usual for a keen search to be, made for alternative products and this leads to diversification. What diversification is possible in grassland utilisation ?

Dried Grass;.

In the struggle which is now proceeding in countries which have adopted economic nationalism, to make themselves self sufficient insofar as food is concerned, some difficulty is being and will be experienced *in* providing adequate feedstuffs for the increased animal population necessary in pursuance of this policy-. The fact that New Zealand han grow grass with a remarkably high protein content, *raises* the possibility that we may ship this grass in the dried or preserved form for cattle feeding overseas instead‘of feeding it to our own cows upon whose products there are already threats of restriction, The value of dried young grass. as a winter feed for'dairy cows has been proved at Jeallots Hill. Unfortunately there is at present no drying and pressing machinery which is quite satisfactory *for* doing the prccessing. A growing and a ready sale now exists. fcr such'cattle feed in England at a'price of £7. a ton. New Zealand because of its unique potentialities as a grass growing country could produce at low cost and place a superfine high protein concentrate grass cake powder cr chaff upon any overseas market requiring it. This would give a new use for surplus grass grown in the wetter districts of the Dominion.

In England as a development of the work of the late Prof. T.B. Wood of Cambridge and Sir. Frederick Keeble the value of dried grass has 'been proved experimentally and its use is now being adopted in certain quarters, There the practice is to encourage the aftermath growth following a hay crop by topdressing with 1½ cwt. of a nitrogen&s fertiliser, This is estimated to yield under English conditions some 3 tons per acre of dried grass containing 10 cwt. of digestible crude protein. The composition of' th'fs dried grass makes it an excellent concentrated stock fodder containing as it does 13% protein equivalent, 56% starch equivalent, and 9% of minerals in their natural state while the carotene content, that material which is rich in Vitamin A is 30 times as high as it is in ordinary meadow hay, As protein analyses of N.Z. pastures have 'shown higher. values than these-,,, dried grass manufactured here will possess still more desirable features as an animal fodder, and the possibilities of development Of an overseas trade in this must not be'overlooked. As has been pointed in England the yield of protein per acre provided by dried grass is far in exe-ess of that provided by alternative crops whose yields are approximately as follows:- Oats 1½cwt., Barley 1¼ cwt. Beans 4 cwt;, Mangolds 3½ cwts.

At this Conference last year a number of speakers with actual practical experience in the more favoured portions of the North Island were almost prepared 'to consider that the stage had been reached when Supplementary feeds other than grass products could be dispensed with provided due attention had been given to grassland management.' If by attention to problems of conservation means can be found for preserving in its stage of highest nutritive value, the surplus grass. of the most favcured months, 'it may be prove'd safe to extend this reliance on grass to more southern districts.

Grass Seed.

In view of the very recent recognition of the potentialities, of grass as a crop, it would se'em reasonable to expect that in the course of time other countries of the world will develop a grass consciousness also. If so then a search will begin for the seeds of grass and clover strains which will be suitable for improving their own pastures. Even at the present time New Zealand has a reputation as a seed producing country and possesses a trade worth over £150,000 annually, which has been developed before the marked advance of interest in grass which has arisen so recently. It must be borne in mind that the Dominion possesses within its very narrow compass a range of soils and climates such that if seed raising was taken up seriously in association with a sound seed investigation policy New Zealand would be in a position to provide strains suitable to the soil and ecological conditions of almost any country in the temperate zone.' Furthermore if full attention was given to the scientific aspects of plant breeding and every use made of advances in cytology and genetics, a lead could be maintained so that there would be available from New Zealand newer strains suitable for superseding those which went before, thus ensuring a permanent trade in pedigree pasture grass and clover seed.

The success which has attended the exploitation cf such species as Waipu Brown Top, Hawkes Bay Ryegrass, Akaroa Cocksfoct and Chewings Fescue, indicates and suggests that in those districts suitable for seed growing there exists very useful possibilities for diversification.

Tendency towards Freedom of Trade.

The type of economic future which may be envisaged at the present would appear to be one of slow recovery from the trough of the depression, a recovery which is apparent in a slight.degree even at present. Already the age of trade restrictions and planning appears to be on the wane. There appears to be a gradual yearning to return to freedom of trade, once industry gets utterly disillusioned about the specious merits of planning and control. Tariff restrictions and such measures usually have a short term advantage fcr those in whose interest they are imposed but the consequent adjustments which must follow generally reduce the advantage and when long term effects became apparent they are generally injurious. The inherent economic advantages which arise out of freedom of trading must steadily reassert themselves though they will be obscured by political and national influences.

Hesitant Progress.

The position today is one where there exists a large amount of new knowledge gained only during the past few years and as yet far from fully exploited. Its adoption is likely to be hesitant because farmers are unable to meet the additional costs involved in putting It Into practice and because of the lack of confidence in an uncertain future when:: overabundance of supplies is everywhere in evidence and policies af restriction are daily being threatened. Over everything there hangs the pall of law prices made all the more depressing because of the high degree of capitalisatjon associated with the years up to 1930.

What of the future?

What then is the future for grassland utilisation. What developments will be probably within the next decade. Obviously these developments will depend much upon what happens in the world's trade generally. At the moment this is dominated by economic nationalism with all its paraphenalia of tariff barriers, quotas and embargoes, The question is " Is this likely to persist?" Suppose for a moment that it will persist andNew Zealand has to play the game ef economic nationalism which will involve almost certainly a very considerable reduction in its now large export trade of grassland products. It will then be a case of adopting Bernard Shaw's

recommendation and consuming them ourselves. While there is no doubt, too many in New Zealand who, by stress of the times, are consuming less than the desirable amount of milk, butter, meat and wool yet our small population is by no means in a position to consume any very large proportion of our present production. It follows therefore that one course to adopt in these circumstances is to increase our population by yeilding up manufacturing industries contemporaneously or a little subsequent to establishment of additional population on the land. In view of our 'chronic unemployment figures of over 50,000 this seems a strange recommendation but. it is desirable to have everyone at least earning his own subsistence r'ather than taxing others for this purpose. Settlement on the land seems to be the only way of ensuring this. All so settled will later on rank'as consumers of the products of the manufacturing industries established to provide for the increased population; The situation then becomes one of population increase and in New Zealand carrying only 17 persons to the square mile as at present, there appears to be ample scope for a much greater rural population than there is there today. This being the case there will be need fbr utilisation of grass along more intensive lines. Were such settlement projected at the present time, then it should be undertaken on the best class of land, that which in fact, is best suited for the exploitation of all recent new knowledge.

Reviewing what will probably happen in connection with grassland development in the economic future which has been outlined, the outlook will be somewhat as follows:-

(1) On the better class land diversification in farming will become more general and the practices recommended as a result of recently gained knowledge will gradually be adopted. Under the spur of eccriomic necessity and, -hindered by the handicaps such imposes, this change will be gradual. A tendency to treat grass thoroughly, will appear i.e. care will be taken in preparation of tie seed bed, the strain of seed will be carefully selected, manurial practice and management practice will improve and much more attention will be devoted to the full utilisation of the grass yield.

(2) On. lighter land where the establishment o'f a good pasture is now difficult the situation will be eased by (i) the researches directed to grasses and clovers of appropriate strains to suit their purposes better than is done at present, (2) the extension of irrigation on the drier districts which will alter entirely their grass ecological problems.

(3) In districts of lighter rainfall the importance of the grass seed crop will increase while in those of heavy rainfall attention can be devoted to an export trade in dried grass of high protein content.

A question which will concern many will be whether they use their pastures for the production of meat or of dairy produce where these are alternatives. The economic outlook at present does. not permit of a clear answer being given to this question. Price fluctuations are likely to occur frequently and the best course to adopt would be to follow the use for which'the land is best suited by nature. An inspection of certain statistical information relating to grassland utilisation during the past 25 years will show that this has proceeded at very uneven rates of progress. Increases in stocking for example have proceeded as follows. Total Cattle 140 per cent increase between 1909 and 1934.

Dairy Cows	280
Pigs.	170
Sheep	22

During the same period of 25 years the total population of New Z'ealand increased by 50%. The percentage increases in exports,

during'the same period were as follows: -

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Wool	25%
Frozen Meat	90%
Butter	760%
Cheese	over 400%.

While it may be possible by fully utilising all the newer knowledge gained during this period to maintain this rate of progress, such is unlikely unless the demand improves at a much greater rate than appears likely today.

The marked increases which have occurred in dairy produce and in meat have been rendered possible by grassland development which has tak-en place on land and in a climate admirably suited for dairying. These developments have been much greater in the case of the cattle industry than in the case of sheep. If therefore any modification are likely to be in the future it might be reasonable to anticipate a relatively greater scope for sheep products, particularly for quality lamb and therefore any attention devoted to making use of the sheep for conversion of grass to meat seems worthy of consideration. This is a field to which has not been so thoroughly explored as dairying.

The demand for pigmeat too; remains as yet not fully supplied and affords another avenue for utilising grass. The question is now the subject of investigation and is well worth consideration, grass providing as it does another alternative source of feed supply which will serve as a foundation feed and reduce the amount of concentrates necessary. If the possibility exists for several alternative usages then as much diversification as circumstances will permit should be employed. This will permit of better pasture management, allow of increased, labour to be used on farms and later on in prices and conditions warrant it enables a transition to be made readily so that sphere offarming which in itself is productive of best returns. When prices of all products are low as at present it is sound procedure to increase the range cf goods produced, to improve their quality and. look for a number of small returns rather than a comparatively large return from a narrow range of products"

Influence of New Knowledge of Nutrition.

There are other developments occurring at present which have an important potential bearing on the utilisation of grassland produce. Studies of human and animal health and nutrition in recent years have demonstrated the value of grassland products and when understanding of the high vitamin content of these products becomes more general then there is likely to be a/proportionate increase in their consumption. As yet we appear to be only on the threshold of development in this direction. and what results are already secured are of a distinctly hopeful character.

Production of Quality goods.

Another feature is concerned with production of quality products of grass. In the competition which wiil continue unabated New Zealand will have to maintain and if possible improve, the quality of its grassland products. Grassland management will. play a part in this. Not only will undesirable characteristics require to be removed from these products but on the positive side a definite attempt should be made to implant better ones. Flavour plays an important part in regard to the demand for cheese: butter and meat. In some of these our products have earned a high esteem but in others there is room for improvement and some of this may be secured by attention to the quality and composition of our pastures,