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THE ECONOMIC RELATION OF SHEEP AND CATTLE TO GRASSLAND FARMING UNDER VARYING MARKETING CONDITIONS.

INTRODUCTION:

The purpose of this paper may be defined as an attempt at an economic consideration of the present and future course of sheep and cattle farming in the Dominion, in the light of the various factors influencing these sections of our farming industry, and at the same time an examination of what course of grassland investigations is be'st designed to fit in with the sound development of these two branches of farming.

The subject will be approached by an examinatio of any trends apparent in recent times in both sheep-farming and cattle-farming, and also by a survey of the general directions which investigations of grassland problems have followed. An endeavour will be made to assess how far these trends are likely to further the national interest as well as that of both farmer and investigator. The paper cannot do more than direct attention to these phases of an important problem and to evoke such thought as will provoke in all the question "Whither are we going, and how far are our efforts likely to be successful in the future?"

LAND RESOURCES:

The total area of the Dominion which is in occupation, is some 42,728,000 acres,, Of this total approximately 17,000,000 acres comprise sown pastures, 14,000,000 acres are in native tussock grasses, and a further 4,000,000 acres are in fern and scrub. Approximately 5,000,000 acres are devoted, to dairying, all-of which will be on sown pastures, so that at least 12,000,000 acres of sown pasture, and 14,000,000 acres of native tussock lands are available for sheep and cattle grazing, quite apart from that not inconsiderable area of agricultural land which is also similarly used. The problems, then, of some 26,000,000 acres are those to which consideration must be given by the pasture research worker who is concerned with the sheep and cattle industries. In this class of farming there are probably about 22,000 holdings,, It will at once be realized that these holdings comprise all classes -of land from the rich lowland flats, to almost barren mountain tops,, These classes of land present to the research worker an extensive range of problems, and with him up until very recent years, the urge has continually been the need for more production, and cheaper production. When prices were rising the firstnamed predominated; when prices declined the latter exerted the greater influence. With the advant of quantitative restrictions through proposed quota impositions in a time of acute falling prices, the whole outlook becomes changed.

The sheepfarmer is interested in the price received for wool, mutton and lamb. At the present time all of these are at a remarkably low level, and with the exception of wool, none show any signs of improving, Lamb and mutton, in addition, are threatened with quota restrictions; which, though designed for the purpose of raising' prices, may result in an aggregate lessening of returns to the farmer: and certainly will negative any attempt he may make to offset the effect of low prices by increased production.

BEEF:

In the case of beef, the position is equally complicated. Since Argentine Chilled beef came on to the English market, the export of New Zealand frozen beef to Great Britain has been greatly reduced, falling from 388,000 quarters in 1933, to 47,000 in 1929, since when there has been a slow increase until this year, when a most marked advance took place. Comparatively little attention has been devoted to the maintenance of beef herds, and unless there is a sufficient supply of high grade foundation stock still in New Zealand, increase of our beef herds and improvement of their quality is prohibited by quarantine regulations. The success of the recent shipment of chilled beef, using gas storage, can only be of advantage to the Dominion to the extent of placing New Zealand on a footing of equality with the Argentine, as regards the faculty of

being able to despatch beef in a chilled state, New Zealand has still to overcome the handicap of higher transport costs, and possibly also of inferior quality, before she can again economically market chilled beef in Great Britain, The success of the recent shipment of beef in gas storage will also encourage additional competition in the beef market from Australia, In view of the fact that the feed conversion rate of a beef animal is only. one-fourth that of a dairy cow, it is likely that the beef industry will assume large proportions in New Zealand because it is characteristic of extensive farming rather than of that intensive farming, towards which, New Zealand is now moving, Beef production, however, is likely to figure to a certain extent, and be fostered by the diversification in farming which will appear as the result of low prices persisting for some years at least, a condition which seems likely,

Even if the beef industry is to occupy this posit ion, it will require a great deal of attention from those attempting to foster it. In the Argentine 99.9 per cent. of whose beef is shipped to' Great Britain, it is asserted on the authority of Mr. Christopher Turner?,' that there are millions of acres of grass which will 'feed one bullock to 2 acres (in many cases less) . A recent survey of British consumers' preference by F.J.Prewett* made on the basis of beef prices in the Nowich and Rugby markets, indicated a marked preference for light-weight beasts, i.e. those ranging about 7 cwt. Obviously, therefore, New Zealand will require to produce sufficient grass on areas ofless than 2 acres per beast, to fatten baby beef rapidly in order to compete with the Argentine. The trend in beef production during the past years has been a decreasing one, and though a'temporary rise occurred in 1928 and 1929, the decrease since that date has been marked. At the present time the annual slaughterings, of beef animals is some 300,000 and of this about one-sixth is exported, leaving New Zealand some 146 lbs. per head available for annual consumption,,

Killings.

1923-24	...	...	323,000	quarters beef.
1924-25	...	...	459,000	" "
1925-26	"	"	216,000	
1926-27	0..	...	184,000	
1927-28	...	. .	395,000	
1928-29	...	...	151,000	
1929-30	...	...	177,000	
1930-31	...	...	143,000	
1931-32	...	...	186,000	
1932-33	...	...	422,000.	

The beef animal does not appear to have a bright future insofar as New Zealand is concerned, and being marketed at a low specific value per lb. as comp ared with mutton and lamb, and with additional charges if sent chilled, conditions do not appear ***to favour*** marked expansion in this phase of the pastoral industry.

Nevertheless, the beef animal has a place on many farms, and on account of its function in maintaining pastures in a state satisfactory for sheep andf or dairy cows, it must not be overlooked. One of the changes which will characterisse the present depression will affect such land as will be placed on the submarginal class, with the fall in prices. On such land there will be every inducement to reduce expenditure on maintenance. Whether this be by means of reducing topdressing, neglecting fencing, and adequate stocking, the net result will be the reversion of land to noxious weed growth. This is the type of land that should normally be grazed by beef cattle, merely to check as far as possible reversion to fern and to scrub from which, especially on hilly country, reclamation in the future will be most difficult and costly. This contingency is liable to occur on any farm in the North Island west of the main dividing ranges, once economic stress induces the farmer to 'let up' on his pasture management. During the past few years the encoachment of fern and scrub on much good hill country has been very marked in certain sections of this area. The great national problem here confronting grassland investigators

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* World Agriculture, p. 119.
ø Journal of the Ministry: of Agriculture,, England, June, 1933, p.219.

is to prescribe some form of management to check this reversion and to maintain this class of land in a condition from which it can again be brought into definitely profitable use. In this stage of maintenance the beef animal must play a part more as a cultivator than a beef producer, the attention devoted to the ecological changes which arise in consequence of grazing by such beasts. In association with beef animals, attention will also require to be devoted to those types of pasture grasses best adapted to maintain such a growth as will, under conditions of lack of topdressing; prevent the progress of noxious' growth of fern and scrub. To those interested in this class of land, whether as owners or as mortgagees it is obvious that the best course to be adopted is one which, mith a minimum of outlay, they may at least maintain their security and appropriate management of the pastures; making use of bullocks and yearlings may afford a means of so doing, and at the same time provide something to offset the costs involved.

RECENT TRENDS IN SHEEP:

A brief review of the trends 'in the sheep. industry reveals the following facts:-

(a) Total Number of Sheep:

The total number of sheep in the Dominion has shown during the present century a progressive increase, which has taken the form of a series of waves rather than a straight line trend. Peak figures werereached in 1902 (20.3 m.), 1910 (24.2 m,) 1918 (26.5 m), -1930 (30.8 m.). The peak periods occur at 8 - 12 yearly intervals, and seem to accord approximately with a similar state of affairs found by K.A.H.Murray as occurring in sheep production in Great Britain, the period there being 6 to 9 years during the past half-century; The nature of the curve is not symmetrical, the fall to the trough occurring more rapidly after the peak and the recovery following at a slower rate. At present the Dominion is in the third year of a decline from the peak period of 1930, the interim figures for April 1933 of 27.7 m. being 3.1 m. below those of 1930. The rapidity of the fall appears to be easing, so that a gradual recovery should soon be shown, and if the previous trends are repeated then in 1938 the total sheep population should reach approximately 34,000,000.

(b) Number of Breeding Ewes:

The ewe population is the safest guide to the trend of the sheep industry, and statistics shorn that this fluctuates in' a similar way to total flock numbers, During the past 25 years the ewe population has increased from llm. to 17 m. or to the extent of 55%. Moreover; the percentage of ewes to total flock has also advanced from 50% to 59.4% and remains at this comparatively high figure despite a serious drop of some 500,000 breeding ewes during 1931-32. Maintenance of a high ewe population enables increases to be readily secured, should conditions warrant it,

(c) Flock Size and Numbers:

In recent years there has been an increase both in the total number of flocks in the Dominion, and in the proportion of these comprising less than 1,000 sheep. For 1932 the total flocks number 30,449 as compared with 26,000 in 1928, In the same period there has been an increase in the proportion of flocks under 4,000 from 69% to 73%. These figures would indicate a tendency for the extension of flocks to smaller holdings. In the Auckland province particularly has this tendency been marked. Some 1,500 new flocks averaging less than 500 sheep have been reported in this province, while Southland also displays the same tendency, It, is therefore evident that the practice of grazing small flocks on dairy farms is on the increase.

(d) Killings:

There has been a marked upward trend in the number of sheep and lambs slaughtered. each'year. At present the totals are:-

Sheep 5,230,000. Lambs, 8,830,000. Total 14 million.
This figure-is approximately four times what the slaughtering totals were at the beginning of the century, and double those of the immediate pre-war years. There has been a very marked upward rise of 40% since 1928-29.

A n even more significant trend is found when in comparing the relative numbers of sheep and lambs slaughtered each year during the present century it is found that while in the first two decades sheep slaughterings generally exceeded those of lambs by 1921 lambs took the lead, and have maintained this lead since. In recent years the lamb slaughterings have in general been double those of sheep, This indicates on the part of the farmer a preference for the rapidly maturing beast which has been. a characteristic of other phases of agricultural development, During the period, moreover, since 1921 the English consumer has expressed a preference-for'the smaller joints which a lamb carcase could more readily supply. During the period 1925-29 some 63 per cent. of New Zealand's exports of mutton and lamb to Great Britain consisted of lamb:

(e) Wool:

Following the increases in the numbers of sheep the total wool production has fluctuated (though not so regularly as sheep numbers) with a distinct upward tendency-which has become very pronounced between 1924 and 1930, when production moved upwards from 190 million lbs, by an increase of 41% to 267 million lbs, The latest figures show a decline in production to 240 million lbs.

Exports of wool have not followed closely the annual production, as with the serious fall in prices, there has been a tendency to hold back clips in order to make better realisations. The price trend In the case of wool has been very distinctly downwards,

1925	Av, price per lb; 20d.	1930	8.59	d.
1926	12d.	193-t	5,66 d.	
4927	13d.	1932	5.27	d.
1928	17d.	1.933	5.18 .	d.
1929	15d.			

Little change has been'perceptible in the weight of fleece produced.

The extraordinarily severe fall in price has given rise to a very serious position in the case of all pasture lands whose sole production is wool. The extent of -the fall was such that no measures, were possible 'which would in any way offset it.,

DENSITY OF SHEEP AND CATTLE POPULATIONS,:.

New Zealand ranks as having probably the highest per-acre stock carrying capacity of all countries in the world, and the following figures for sheep and cattle indicate how this carrying capacity has been increasing in recent years.,

	Sheep per 1000 acs.	All cattle, per 1,000 acs
1923	467	79
1924	483	81
1925	511	80
1926	520	78
1927	538	74
1 89 2	551	74
1929	581	78
1930	622	86
1931	637	9 4
1932	609	9%

It will probably be conceded that all stock in New Zealand are now being better fed as each year passes, and the figures above quoted therefore indicate that each acre is being required to furnish increased feed units to support additional numbers of stock. Probably the influence of topdressing has been responsible for the greater part of the rapid increase noted during the last few years, but some significance must also be granted to the spread of sounder knowledge of grassland management in other spheres also,

QUOTAS:

WOOL At the present time there seems to be no prospect of any 'quota being placed upon wool, though there is no reason why wool should be exempted if, in the future quotas are to become a regular feature of agricultural marketing.. For the present, however-, wool may be regarded as remaining in a freely competitive market.

MUTTON AND LAM·: Insofar as New Zealand is concerned, mutton and lamb do not come under a direct quota. The quota restrictions apply only to foreign supplies of mutton and lamb, and are applied progressively by quarterly increments of 5% from an initial reduction of 10% for the quarter ending 31st March, 1933, to 35% for the quarter ending 30th June, 1934. The New Zealand position in regard to mutton'. and lamb is governed by paragraph 4 of a letter sent by the' Hon. J.G. Coates to Mr. Baldwin, at Ottawa, on the 19th August, as follows:-

4. "To assist in the orderly marketing of supplies the Dominion will give a reliable estimate of shipments of muttonand lamb as early as possible in each export season... This season will necessarily cover the period the 1st October in one year to the 30th September in the following year. For the 'season 1932-33 we estimate our export of frozen mutton and lamb at 200,000 tons with a 5 per cent. increase in each of the following two years, For the calendar year 1933, you may take it that our shipments of frozen mutton and lamb Will be the same as those of the twelve months ending the 30th June, 1932 - i.e., of the year which ended with the month immediately preceding the opening of the Conference."

Reducing these terms to actual figures, the exports of New Zealand lamb and mutton for the twelve months ending 30th June, 1932 are as follows:-

	Tons,
Lamb	125,134
Mutton , ...	63,740.
Total ...	188,874 tons.

As indicative of the position in New Zealand during the present year, as regards the quota, the export figures for lamb and mutton for the first six months of 1933 are as follows:-

	Tons.
Lamb	101,217.
Mutton	29,042.
Total ...	130,259 tons.

If the terms of the arrangement are to be adhered to, then New Zealand exports of mutton and lamb for the period July 1st - December 31st 1333 will require to be restricted to an export of some 59,000 tons. For the same period in 1932 the exports amounted to 60,400 tons. This agreement is regarded by British authorities as possessing the full significance of a quota.

BEEF: The arrangement in regard to frozen beef is dealt with in paragraph six of the same letter:-

6. " In frozen beef we estimate our exports for the season 1932-33 at not more than 22,000 tons, representing a maximum increase over the previous season of approximately 10 per cent.

In this case the exportsfor the first six months of 1933 have amounted to 22,193 tons, and the killings to 420,757 quarters, or probably 29,300 tons of beef. Quota restrictions will apparently not apply to sheep and cattle byproducts, and of these hides and pelts are assuming an increasing importance owing to the marked rise in prices which have occurred recently.

RECENT TRENDS IN GRASSLAND KNOWLEDGE AFFECTING SHEEP AND CATTLE IN NEW ZEALAND,

The conception of grass as a crop is a distinctly recent development of New Zealand pastoral farming, and it is necessary to review what have been the' characteristic developments in grassland knowledge during recent years. In the following paragraphs there will be passed rapidly under review the main avenues which pasture research has followed:-

(1) ECOLOGICAL INVESTIGATIONS:

In this section reference is intended to be made 'to the type of work done by Dr. Leonard Cockayne, Mr. A.H. Cockayne and Mr. Bruce Levy in the pasture establishment and maintenance problems in the hill country districts of, both Islands. This work has been done on an extensive scale, and has made available to the pastoralist'on those areas a great deal of useful information- concerning, firstly, pasture establishment, and secondly, and perhaps much more important, pasture maintenance and management, and the conditions where such present exceptional difficulties. This work has a bearing on the problems of all hill country pastures in New Zealand, but as yet the, field for research in this direction is exceedingly wide,

(2) PASTURE UTILIZATION:

The newer knowledge gained as the result of studies of' the high nutritive values of young, intensively grazed pastureis. generally well understood. and has a particular bearing for the present on the better types of pasture found on land of higher fertility. It has been shown that New Zealand pastures properly managed are capable ofproviding a yield of protein in excess of 'that recorded elsewhere.

(3) CHANGES IN THE MINERAL CONTENT AND NUTRITIVE VALUE OF GRASS THROUGHOUT THE YEAR:

The analytical work carried out by the Plant Research Station, Cawthron Institute, Lincoln College and the Chemistry Section of the Department of Agriculture has thrown a great deal of. new light upon the varying value of pasture grasses during various months of the year, and under various climatic conditions. In particular the new knowledge regarding the part which mineral composition, especially the content of lime, phosphate and iron, plays upon stock unthriftiness, has a special significance for the sheep farmer, The application of this knowledge has-a particular bearing upon hogget mortality -and unthriftiness, which are one of the'serious drawbacks to sheepfarming. Arising out of similar investigations, the solution of such deficiency diseases as bush-sickness and dopiness, has been reached, thereby making possible the maintenance of sheep: on areas of cou-n-try where it was hitherto not ec-onomically possible, There is every indication that similar investigations,,' whenextended to areas where stock unthriftiness is present, but not to a very manifest extent, good results will also follow,

(4) DEVELOPMENT OF STRAIN IN PASTURE PLANTS:

Striking results which have particularly attended the strain selection work carried out on perennial ryegrass, white. clover, and cocksfoot has been productive of new knowledge, which, when put into practice, has enabled marked increases to-be effected in the carrying capacity of pastures. Up to the present time the strain selection work has largely been confined to those varieties of grasses and clovers which thrive best on first and second class lowland country where the system of farming has been on intense. or moderately intense lines, 'In view of the extens'ion of sheep farming to the smaller farms, which has been a particular characteristic of the Auckland province recently, this work is likely to have a direct bearing on the Dominion's sheep numbers in future.

(5) TOPDRESSING:

A considerable amount of new knowledge has been gained as to the best methods of utilising the topdressing of pastures with mineral fertilisers. In the case of phosphatic manures, the knowledge has applied particularly to such points as the frequency and time of application, and to the effect of phosphates in combination with other manures, With nitrogen and phosphatic manures, new knowledge, has been gained regarding their methods of application, their influence in extending the growth variety of pastures? so that the lean periods of the year are now reduced in length and intensity. While phosphate top-dressing is extended, to some extent, to hill country, the use of nitrogen and potash remain more closely confined to the most intensiveiy utilized areas.

(6) PASTURE ESTABLISHMENT:

A good deal of new information, which has led to methods whereby new pastures are established on sounder lines, has also been gained, with the object of securing, in general, more permanent swards, thereby replacing frequent ploughing by better manage-ment, including the use of a certain amount of grass cultivation in association with topdressing.

A general review of the trend of the newer knowledge of grassland farming indicates that up to the present the greater part of this has a more direct relation to the better class lowland lands of the Dominion. As yet, the knowledge has not had sufficient time to extend to a very considerable area, even of these lands. It has been applied, to a very slight extent, to a good deal of the sheep' and, cattle grazing hillcountry of both Islands. It would be difficult to assess What is the 'total influence which would be exerted by the application of this new knowledge on any particular class of sheep and cattle country. All. this new knowledge should bc applied with due attention given to ensure that each phase is given its appropriate place in the management 'of any farm, Consequently it must be taken in association with stock and general-'farm management factors, in order to avoid lopsided development. Nevertheless, it would be safe to say that were this knowledge put fully into application, the sheep and cattle numbers could be considerably increased within the next decade, when probably almost double the present numbers could be carried, It is extremely difficult to assess the potential stock carrying capacity of the pasture lands of the Dominion, farmed completely in the light of our. present knowledge, and this forecast is based upon a rough approximately of what has beenachieve d in a number of cases where attempts have been made to put into practice-parts of this newer' knowledge.

The purpose of this parallel examination of grassland research trends and of trends in the sheep and cattle industry has been to bring into relief the position which has arisen as the results of attempts made on both sides to cater for an ever-expanding demand In both cases expansion is the dominant characteristic.,. Production at lower costs, production of higher quality exports are also prominent motives. Though it is not evident that world overproduction is a cause of the present difficult economic situation, the grassland worker will realize that increases in mutton, lamb and wool shipped from New Zealand are the cause of serious embarrassment in our main market. In an endeavour to save farmers from the effects of a drastic price war, planned marketing under a system of quotas. is receiving a great deal of thought, and it is not unlikely that some. such scheme may be put into practice. The question at once arises as to how grassland research should be directed to meet the new situation,

AN OUTLINE OF THE COURSE GRASSLAND INVESTIGATIONS 'SHOULD TAKE IN ORDER TO CATER BEST FOR THE NEEDS OF THE FUTURE.

Assuming that quota control will be applied to mutton and lamb in a manner similar to that which now prevails in the terms of the general agreement, it would seem evident that New Zealand's pastoral resources at the present time are adequate to provide all that Great Britain is prepared to take, There has been a gradual increase in the per head consumption of mutton and lamb in Great Britain since 1923,

totalling about 4 lbs.per head, In view of the encouragement which is at present being given to British farming it seems likely that this rate of increase will be provided'for by British farmers, and there will be no need to call on Dominion supplies. It is obvious that, New Zealand can maintain her present. export without any great effort, Reference has already been made to the increase displayed in the trend of mutton and lamb production. It would therefore seem that under a rigid quota scheme, the application of even part of our new grassland knowledge would only serve to aggravate theiposition. Any quota scheme which makes no provision for -taking additional amounts of mutton and lamb approximately in'accordance with natural increasing production trends means stagnation, particularly in New Zealand, a young country, whose resources offer such scope for development. In a. country which is approximating its maximum potential production,. a quota restriction is much less felt, and causes much less disturbance of agricultural progress, 'While quotas are at present designed expressly to raise prices, this has dangerous consequences wherever alternative products are available. It is difficult to see what will be the consequences where prices as well as Quantities enter into quota bargaining. Presumably there will be few, if any,, mutton and lamb producing countries which could compete in the British markets on a price basis..

In the event of free marketing continuing, then there is every reason to assume a keen competitive war on a price and 'quality basis, Leaving out of consideration all matters other than pasture utilisation, which influence the price of mutton and lamb, then the position confronting grassland research is clear, Costs of production'then become most important, and research should be directed 'into those channels which produce at the lowest possible costs the highest amount of feed units per acre. In such circumstances the present range of activities should be intensified and increased attention devoted to the association of such research more particularly with the animals themselves. Nothing probably could help the grassland research worker more at the present time than, the knowledge of how his endeavours react on sheep and cattle beasts. themselves.

In meat production particular attention is necessary, and probably a good deal could be done to enhance New Zealand's already high reputation for quality lamb, and make it still more- sought after, in Great -Britain by devoting some research to the influence of feeds on quality.,

With a view to. reducing costs of production of fatsheep and lambs it would seem advisable at the present time to devote more attention to the pasture problems of the better second-. class hill country, A great deal of this is at present carrying indifferent swards, and its proximity to more. highly fertile fattening land gives it in many cases real value as a reservoir of store stock for farmers growing feed crops. Establishment f actors and strains of grass. and clover would appear to offer most scope in this class of land.:

In the case of wool, which for -the time being may be regarded as being not subject to quota, it is obvious that al. pasture research should be devoted. towards reduction in costs of production and improvement in wool quality, as far as this is affected by feeding, The question is not a simple one, and something remains to be done to ascertain which avenue of grassland research is likely to provide best results, whether, for example, the adoption of better strains of grass, or fodder conservation is likely to reduce costs, If it is a question of increasing stock numbers, then particular attention must be devoted to the problem of providing at the cheapest rate, feed during those lean periods of the year which serve as distinctly limiting factors to flock growth.

'In the event of a quota being imposed, there will be' naturally a tendency'to let submarginal land go out of use. This will mean that large areas of the poorer North Island hill country will revert to fern and scrub. The cost of subsequently reclaiming this land whenever the'position improves will be very heavy, and in many cases in excess of the Cost of removing the original bush.

Thequestion of pasture deterioration will loom large everywhere in New Zealand, There is here a field for the research worker to devise means whereby this deterioration may be checked, The use of -assertive strains of pasture plants, the adoption of different systems of stock management , may be very effective in this respect.

While the' quota system seems most discouraging to grassland research in regard to sheep and 'cattle production, it should be borne in mind that tariffs, trade barriers and quotas all have a pronounced non-permanent character. A new set of circumstances may do away with all types of restrictions, and this is what should be anticipated in New Zealand. Every use should be made of the present organisations for research to accumulate knowledge in such a way, -as will be very readily put into practice, once restriction is removed, and thus enable New Zealand grassland products to be in a position to capture and supply whatever market is offering.

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