THE ECONOMIC USE OF PASTURES IN DAIRYING

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The subject matter of this paper received very little attention until the end of the great War, until which time farmers had been engaged almost continuously in a process of breaking in land of natural. fertility, and of breeding more stock to consume the grass from the ever increasing area of land available for them. At this period prices for our dairy produce soared to a very high' level which increased our farmers' incomes to a tremendous extent. This had two very bad results, It tended to make our farming community, generally speaking, more inefficient beoause their living was made comparatively easy for them, It shot up the value of land which also had a very unsettling effect on our farmers as they began to look on their farms, not as a means of livelihood, but as something bought to sell again at the earliest opportunity at an enhanced price, This period, like all so-called good times, soon came to an end and with the bursting of the bubble and a return to more sane' prices for our produce, many farmers found themselves with obligations far greater than they could meet on their then level of production, They were faced with two alternatives; that of improving their returns to a point so that they could meet their commitments or of making way for somebody else. Few relished the idea of quitting, and it speaks well for our farming community that the vast majority set to work to improve their positions so that they would not have to face this alternative.

Now what were the means available, controlled largely by the ability of our farmers, to bring about this improvement? They lay broadly speaking in two main avenues,

(1) By increasing the efficiency of the stock which they utilised to convert their grass into butterfat. This is'a story in itself and not within the province of this paper,

(2) By increasing the stock carrying capacity of their properties.

Let us now consider the various means'adopted by our farmers to achieve this object, The one that first had the greatest effect in this direction was the use of artificial fertilizers. At this period our farmers were continuously being exhorted to produce more, to produce two blades of grass where one grew before, This injunction our farming community carried out literally per the aforementioned medium and were soon able to produce much more economically than they had done previously, With the help of our 'scientists our farmers soon found that they could do more than had been asked of them, They found that with the use of artificial fertilizers vast areas considered formerly well nigh worthless and growing only stunted scrub and fern, were capable of carrying a good sole of grass and giving a high production per acre. This vastly accelerated the development of the industry and many thousands more were settled on the land with dairying as' their means of livelihood, The amount of fertilizers used steadily increased right up until the advent of the present real depression. Some farmers had increased their annual dressings up to 6 cwt. per acre and more and declared that it paid them handsomely to do so. Present prices for our dairy products have forced the vast majority of farmers to decrease the amount of fertilizers they have been using; some to a point where unfortunately it is becoming very noticeable in the deteriorated condition of the sward, With others, however, who have reduced their annual dressings of superphosphate say from.4 or 5 cwt. per acre to 2 or 3 cwt. no deterioration in the composition of the sward is noticeable, and little if any reduction in the carrying capacity has taken place, taking into consideration the variation in the seasons concerned, This has provided many farmers with food for much thought. What is the economic limit of fertilization at present world prices for our dairy produce? How much,

extra manure could or should be applied to show a safe margin of profit for every penny per lb. increase in the price received for our butterfat? What is the least amount of fertilizer one could use without suffering deterioration in the composition of one's sward? These quest ions are of vital importance to the industry at the present time when we are fighting to reduce our costs of pro duct ion to the lowest possible level.

Contemporaneously with the appreciation of the value of artificial fertilizers for more economical production, there was being evolved a system of rotational or intermittent grazing, which was destined to bring about a vast improvement in the productive ability of our pastures. Previous to this most farmers, generally speaking, adopted a system of more or less continuous grazing with the result that by mid-summer a great many of their pastures had run to seed. This rough feed was considered necessary as a sort of subsistence ration for our stock during a large part of the winter months, Practical experience showed us that it was of little use for milk production and we soon realised the great difference between the returns obtained from our dairy stock *on* this class of pasture and that when they were grazed on the aftermath of our hay paddocks, It was this that was responsible in a very large measure for the introduction of the rotational system. The ideal of the fresh bite being always available for the dairy stock was the one consideration; few then realising that in operating a system of this kind they were not only getting a better quality food for their stock, but were also, getting a far greater quantity throughout the year.

The system of actually controlling one's pastures was a logical outcome of the rotational system. The idea first came forcibly before the notice of the writer some 13 years ago when in following the usual rotational practice he had in his area to be grazed two small 7 acre. fields that had been fenced as such' on account 0 f drainage operations, Next to these was a 20 acre field. In the usual routine of grazing 3 days was always obtained from the 7 acre fields with 120 cows, but with the 20 acre field after 4 'days grazing the cows would steadfastly refuse to return to it unless forced to do so and after being forced on one or two occasions always quite strongly expressed their disapproval in the resultant, milk yield. The consequence then was that this large field very early in the season got out of' hand and unpalatable for the dairy stock. The award,' too, was far more open than on the adjoining 7 acre fields. The field the following winter was subdivided into 3 and the next season three days grazing was obtained from each of the 3 fields each time round without any difficulty, giving 9 days grazing where only 4 were obtained previously, and keeping the pasture in far better condition as well. The most economic size of field for grazing purposes was then given very serious consideration and the definite conclusion was arrived at, that it had to be of such a size that it could be eaten off by the dairy stock grazing it in not more than 3 days or 3 nights,

Close observation showed that when the dairy cows were kept on the same field longer than this, a depressing effect on the milk yield always followed, To achieve this purpose the writer considers that on reasonably good dairying land, capable by good management of carrying 70 to 75 cows to the 100 acres, at least 15 to 16 cows must be grazed to the acre, with a resultant number of approximately 20 fields to the grazing cycle. Such a system has I know been discounted by some on account, they say, of the large cost for fencing. I would like to point out, however, that this is nowhere near as bad as it is often painted. A 100 acre farm 50 chains by 20, can be wholly subdivided into 20-5 acre fields and a central race to feed to same with four barb wires three. totara posts to the chain and three battens between each post for a total outlay not exceeding 35/- per acre for materials and I say definitely that I know of no other farm expenditure capable of giving a better return on capital outlayed. Nevertheless, there are but few cases in which such an expenditure is necessary, most farms being subdivided to a certain extent and

where funds will not allow any great expenditure, fences far less elaborate than the ones specified can answer the purpose quite well.

As it was amply proved that it was uneconomic to graze dairy stock longer than three twelve hour periods on each field, thought was then directed to the means off cleaning up any rough tufts etc. of grass, apparently unpalatable before they returned to it once more. Various ideas have been in operation for this purpose, Where an adequate number of dry stock have been available these have been used with good results. Also some farms, most efficiently run, have used sheep to obtain the desired results, Their successful use has been best exemplified to the writer in 'the case of Dr. Annett's farm at Matangi, where one of the finest soles of grass possible to see has been built up by the close application of the principles of controlled rot at ional grazing over a period of years ; but there is a great increase in the cost of fencing necessary if one is to fence sheep proof, and it is doubtful to my mind whether the extra expense is justified, or even whether sheep for followers is the best system with the average farmer, It has been shown that grass can be grazed too 'short with a resultant slower rate of recovery, Sheep are very select grazers and will not eat unpalatable tufts left by dairy cows as long as any palatable morsels are available, with the result that in many cases much of the pasture is grazed really too short before the unpalatable parts are consumed. It would appear that the best end simplest system of keeping one's fields in order for the average farmer is per the medium of his usual young stock kept for replacement purposes and the utilisat ion of the mower,

The extent to which these will have to be used will vary in many cases in an inverse proportion to the extent in which another' great help in the efficient utilisation of our pastures is used, namely the harrow. If I would give credit to one thing more than any other for the evenness of the sward on Dr. Annett's place, I would award it to that great assistant the harrow,' I am satisfied that the tuft nuisance already referred to is practically wholly caused through too little use off this. implement, and that if we could only work our farming operations so that every field was harrowed after each grazing with an efficient manure spreader the unpalatable tuft problem would soon disappear, Not only will we be solving this problem, but we will be receiving the maximum benefit from the natural manure of our stock,

It has been proved beyond doubt that grass grazed in the leaf stage is the finest of all foods for milk production under our conditions. It has been the aim, therefore, of all keen farmers to have this type of food available for as large a part of the year as possible. Some few years back nitrogenous fertilizers were introduced into New Zealand and were the means undoubtedly, where properly handled, of providing good milk producing grass much earlier in the season than had been possible hitherto, It enabled cows to get straight into high product ion from calving time, At the present time it is debatable, however, owing to the great drop in the value of our dairy products whether its use is of economic value.

With the utilisation of all the aforementioned factors and the resultant great improvement in our pastures, many farmers adopted a system of straight out grassland farming, converting all their surplus late spring and early summer feed into ensilage and hay respectively and using this to tide them over the dry autumn and winter period. The value of ensilage as a supplementary food was quickly realised. When cut in the leaf stage it served equally as well as any other supplementary fodder known to the writer for maintaining the milk flow in the dry autumn months, but it has the greatest advantage over all other supplementary foods grown, in that it does not have to be used at any given time, This system of farming received in the Auckland Province an overwhelming majority of support for quite a number of years, Its simplicity was its great attraction. The relief from the worry and uncertainty of the dependence on root crops and the extra work entailed therewith led some to overdo what isundoubtedly a very fine and cheap

system of farm operation. Stories went the rounds that one could make any-thing into ensilage, old thistles or rubbishy grass of any description would all make it. So it will, but the resultant product will always bear a direst relationship to the quality of the material cut for it. "Why make hay, ensilage is just as good and easier to make," said some, The writer knows of some farmers, a few only, admittedly, who still consider this quite good practice, but generally speaking, those farmers who have been operating their properties with a dependence on grass alone for a number of years prefer to make from one half to two thirds of their area shut up into ensilage and the balance into hay, Also the enormous benefit to be derived from the application of artificial fertilizers, tended for a' period, for us to ever overestimate their value. The idea of ploughing to improve one's pastures was considered almost ridiculous when the manure bag was avilable and such things as ploughs, discs and rollers etc. were relegated to the scrap heap.,

In most cases such an opinion would be still holding sway as the cheapest and most economical system of farming, were it' not for the great work of Mr, Bruce Levy and his assistants in isolating the best of the various strains of our grasses and clovers. When we as farmers realised the great difference in the annual production of the best of our grasses as against the others, we soon realised that no matter how much topdressing we did, we could not convert inferior rye grass plant into a true perennial etc. We then set. about to try to convert our fields with the poor type of grasses dominant into one hundred per cent, pastures per the medium of the plough, In the process, many reverted to the idea of taking a crop of roots, which has been quite profitable in many cases where good crops have been obtained, but in others where either through bad luck or bad management poor crops have been the rule with an enhanced weed nuisance to attend to, especially in many parts of the Auckland Province where the Californian thistle flourishes so well with cultivation, it is questionable whether it would not have paid to have ploughed out of grass and back to grass with a certified seed mixture, perhaps with the sowing of a temporary pasture in the process, I do not wish to decry the growing of roots, as in certain areas in New Zealand owing to the severity of the winters they appear to be necessary, but in the Auckland Province, the only area which I know intimately, I feel sure that generally speaking, if me had our pastures up to the 100% standard as exempiified in the types they consisted of, it would not pay to plough them up for the sake of getting a crop of roots.

Now what is the general cycle of events over a'twelve month period on a dairy farm where an endeavour is made to get the maximum utilisation of our pastures, and where the farmer is dependent on grass alone? Let us start in the month of March when, if sufficient rain is available, the largest; portion of the farm will be topdressed. Then if one is dependent on phosphatic fertilizers towards the middle of April two or three paddocks will be harrowed and shut up for early spring feed. if a nitrogenous fertilizer is used, this can be delayed till the beginning of May, when the manure would be applied and the paddock harrowed. By the middle of May or the end of that month if using nitrogen, approximately 25 to 30 per cent. of the farm should be shut up for this purpose, Then as the cows are dried off they will be put away in one of the other fields and when necessary fed hay and ensilage,

When the majority of the cows are dry, a period of a week to 10 days will suffice in one field to give it a real good coating of manure etc., when they will be moved to the next field and the first one will be heavily harrowed. This process will continue through. the winter months until the cows begin to calve again, when the first of the fields shut up will be brought into commission again and while the number of stock to be grazed thereon is only small, maybe a small portion of it will be fenced off nith a temporary fence so that each' break will be eaten off fairly quickly. This will be used by the milkers in the day time only, At night as yet one till not be able to afford good grass as well. Even if one could it may not be

advisable at this period, as a sudden change in food will often cause serious digestive troubles, Therefore, a bare paddock with hay and ensilage is used for the night, This process will carry on varying according to the season certainly, but generally speaking, till towards the end of August or early September when a slight spring growth begins to be noticeable. Then the gields that are being grazed in the day time will not be eaten out so carefully as hitherto, but will be used as night paddocks after the beat has bean taken off them, with a little hay to provide a certain amount of balance for the cows rat ion,

Then towards the middle or the end of September, according to the season, one should be able to provide good pasture for both day and night grazing, It is always a good plan to keep available a little hay for dairy cows in the spring months as long as they till eat it. If possible the first ensilage paddocks should be shut Up about mid-September, the other paddocks for hay or ensilage being shut as one' s feed position improves, the last perhaps not being closed till the end of October, Previous to this, in August or early September, these fields should if possible have been topdressed. The total area cut, when depending on grass alone, should be not less than *30* per cent. of the farm and if it is one's first year on the system, he should stock so that at least 40% of the farm can be cut, so as to provide an ample reserve to fall back on in any period of acute scarcity, The first ensilage cut should be saved specifically for autumn feed for the milkers and should therefore be cut well in the leaf stage , The other ensilage should be cut next and if at a more advanced stage it will not matter greatly, as this will be used in combination with hay during the winter months for dry stock only.

The hay will- be cut last and although we know this to be of the greatest value when cut young, it is practically impossible to get hay to dry in reasonable time when cut before December. If of rye grass and cut early in this month, it mill make hay of a relatively good quality and if of paspalum or other later species of pasture plants, it will be quite alright cut any time up till the end of the year. As to whether a topdressing should be applied to the hay and ensilage paddocks after cutting will depend on one's general position. If 8 good reserve of ensilage is available and the paddocks were well topdressed when shut up it is doubtful whether it is economic. If On the other hand the reserves appear a bit scanty, well then a topdressing to these paddocks should certainly be appiied to save the necessity of using ensilage in the autumn months. From October to February, according to the year, the mower should also be kept going topping all roughage et c . in the other paddo cks, but as said before, if the harrows have been able to be kept going after almost every grazing, the extent of the abovementioned work will be greatly minimised and will be chiefly caused by the necessity of cleaning up thistles etc. If the autumn is dry and the pastures unable to sustain the milk production, then recourse will be made to the ensilage cut in the leaf stage, and thus the cycle will go on,

This is the stage of relative efficiency which we have reached today. Now what developments are there likely to take place that might improve our efficiency in this direction still more? The Virtanen process of making ensilage offers possibilities as a means of providing a food closer to being a replica of the grass it was cut from than our ensilage is, made under the present day system. If we can perfect a means of harvesting grass at a stage *when* it would be normally grazed, its period of greatest value, and of conserving it in such a form that it will be equal in value to what it was when *cut,* it would still further improve our economic position, not that we would get more grass from our fields in ,a twelve month period, but that we would have a greater percentage of what we got capable of producing .a high milk yield, which would be reflected in the butterfat production of our stock.

Blessed with a country well nigh perfect from a grass growing point of view, and with the full command of all the factors bearing on the efficiency of the utilisation of that grass, we should be in a position to produce dairy produce at a price that will compare favourably with any part of the World.
